MARCH 1955
35 CENTS

FOOD ENGINEERING

A McGRAW-HILL PUBLICATION

INGREDIENTS • Properties of caramel color are lab-tailored to your use. p. 94

PROCESSING • Big strides have been taken in deep-fat frying with automatically controlled remote oil-heating system. p. 60

QUALITY CONTROL • Extra-flavor coffee calls for extra close control. p. 78

ALSO: ENGINEERING • PERSONNEL • MAINTENANCE
MATERIALS HANDLING • PRODUCTS • TRANSPORTATION
INSTRUMENTS • PACKAGING •

. . . See Contents Classified by Subject, Page 3

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March 1955

Volume 27 Number 3

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FOOD ENGINEERING

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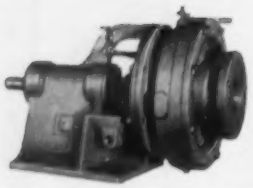
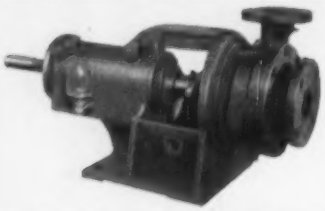
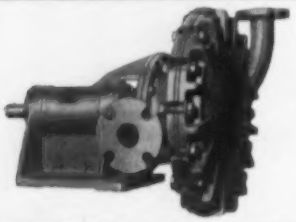
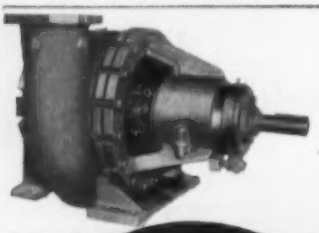
	Frame Mounted: Bulletins 52B6351, 52B6105 Close Coupled: Bulletins 52B6083, 52B6140	General purpose use.	**SSB** Single Suction, Frame Mounted, Grease Lubricated. Also available close coupled.	Heads to 550 feet. Capacities to 3500 gpm. Temperatures to 250 F.	Available in many materials. Choice of packing, single or double mechanical seal.
	Bulletin 52B7638	Chemical and general purpose use in medium high temperature range.	**SSB** Single Suction, Frame Mounted, Oil Lubricated.	Heads to 250 feet. Capacities to 3500 gpm. Temperatures to 550 F.	Available in many materials. Choice of packing, single or double mechanical seal. Stuffing box cooled above 250 F. Bearings protected from corrosive or abrasive laden atmosphere.
	Bulletin 52B6615	Handling fine abrasives in suspension or corrosive liquids.	**P and PD** Single Suction, Frame Mounted, Grease Lubricated.	Heads to 260 feet. Capacities to 1300 gpm. Temperatures to 250 F.	Stuffing box on suction side. Choose packing, mechanical seal or *Equiseal* stuffing box—stops leakage to 15 feet suction head. Open or closed impeller.
	Bulletin 52B7112	Handling fine and coarse abrasives in suspension or corrosive liquids. For larger rating than PD pumps.	**PW** Single Suction, Foot Mounted, Oil Lubricated.	Heads to 260 feet. Capacities to 10,000 gpm. Temperatures to 250 F.	Available in extra-hard materials. Has thick metal sections to withstand abrasion. Easy to disassemble for inspection and cleaning. Open or closed impeller.

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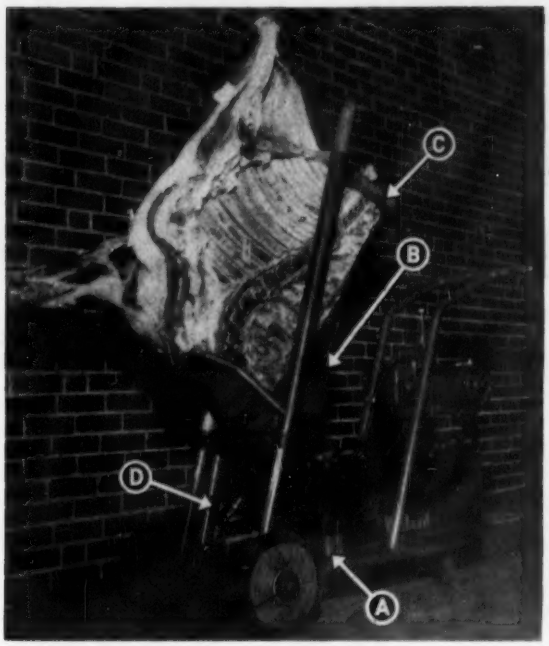

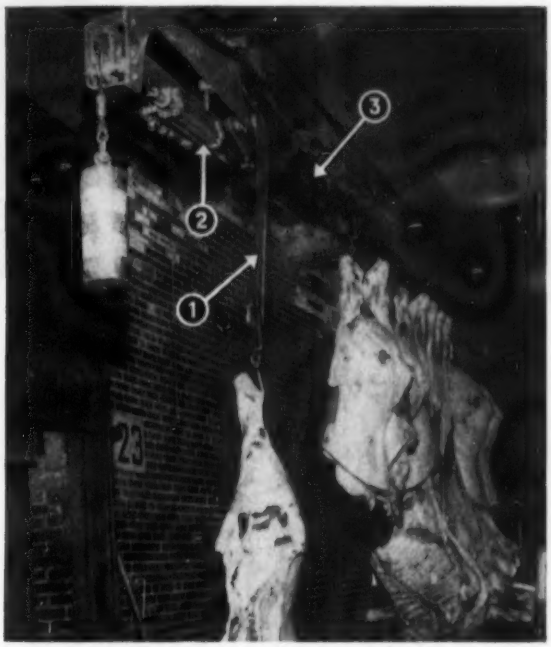

Takes Lugging Out of "Beef Lugging"

In meat-packing field, the job of transferring quarters of beef from an overhead monorail to the refrigerated railroad car or truck for movement to a branch house or customer is called beef "lugging". The meat is carried on the shoulders of the workmen. The task, even for stalwarts, is heavy and exhausting.

In order to facilitate this work a hand-wheeled truck, or buggy, with battery powered hydraulic lift, was developed at the Chicago plant of Wilson & Co., Inc., in cooperation with Walter J. Richter of the Rockford Equipment Co.

It is now used at Wilson's larger plants, in conjunction with a counter-balanced dropper arm. And the system has been very successful in enabling men of average build to do the otherwise arduous work with minimum fatigue.

In operation, the truck—(A) in left photo—is first positioned under the beef carcass, which hangs on a high rail. The receiving pan (B) and carcass support (C) are raised by battery powered hydraulic hoist (D) to engage the beef fore-quarter, which is then wheeled into the refrigerator car.

Here the quarter is raised or lowered to the proper position to attach the car hook for hanging.

Meanwhile the hind-quarter is dropped from the high rail in a specially designed counter-balanced dropper arm —(1) in right photo—which positions it properly on the buggy for the trip to the car and transfer to the car hook.

The dropper mechanism (2) can be moved along the dock rail (3) to convenient locations for loading. Thus, a crew of five men, operating two buggies to a single dropper handle, loads 35 or more beef sides per hour.

The handling device was considered so meritorious by company officials that patent application was made and patents were obtained to cover its application. Both units, however, are available to other packers through Rockford Equipment Co.—*M. J. Hess, Assistant Chief Engineer, Wilson & Co., Inc., Hinsdale, Ill.*

Lab Measures Costly Ingredients

Big savings in candy color and flavor costs can be made by having the plant laboratory measure the quantities required for each batch. We now make all stock color solutions in the lab, with savings of 30 to 35% in color cost. And we have much more uniform colors.

Likewise for flavors. The job of measuring flavor into small bottles, and then issuing these bottles to the candy maker, is a small task but an important one. If you allow one person to measure all flavors, your flavor cost will be reduced at least 30%—and you will have uniformity.—*W. H. Corwin, Brock Candy Co., Chattanooga, Tenn. (From talk at Midwestern Quality Control Meeting sponsored by Sears, Roebuck & Co.)*

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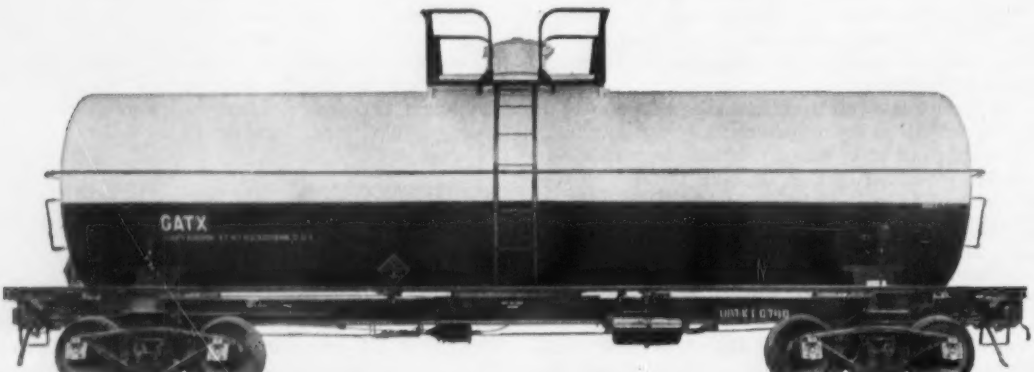

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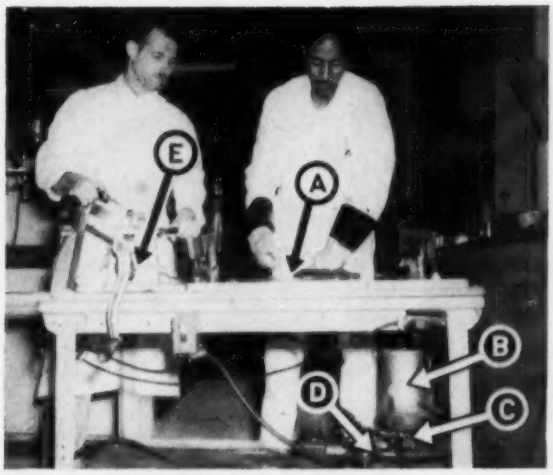


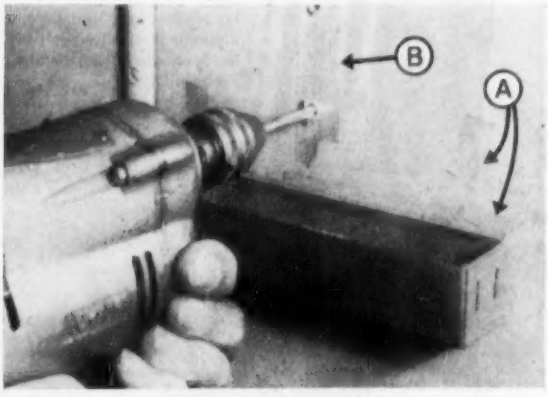
Homemade Hard Candy Mixer

A simple mixing table, resulting from our own ideas and constructed in our machine shop, has enabled us to make up 2-lb. experimental batches of hard candy in our laboratory.

Mounted on top of table is heavy gage, stainless steel warming slab (1¼x20x24 in.). Warm water (150 deg. F.) is pumped-circulated through the inside of this slab (A) from a 2-qt.-capacity metal reservoir (B) located below the table. Reservoir is over an electrically-heated hot plate (C). Pump (D) is driven by an ¼-hp. motor.

Candy is worked on the warming slab, with color, flavor, and other ingredients mixed into it in much the same manner as production-size units. Warm water within the slab prevents the candy from hardening while it's being worked.

Attached to this mixing table is a hand-operated die cutter (E).—*A. B. Cramer, Chief Chemist, F & F Laboratories, Inc., Chicago.*



Maintenance Aids in Drilling

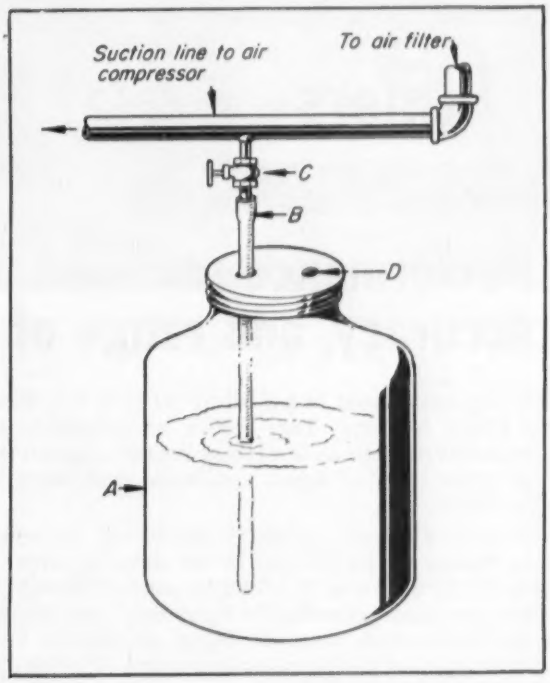
When holes are drilled for the fitting of wall plugs in food plants, scattering of plaster dust and debris should be avoided as far as possible.

Here is a simple method of collecting particles resulting when a wall is drilled with a carbide bit and portable electric drill. The dust catcher is a small shallow cardboard box–(A) in photo–held together by staples or tape. This container is secured to the wall underneath the area to be drilled, also by means of "Scotch" tape.

Two vertical strips of the adhesive form the main support for the box. Another strip runs along the top edge of the receptacle forming a bridge between it and the wall. This latter adhesive strip ensures that dust goes into the box and not between it and wall.

On rough surfaces where appearance is not important, dirt-catcher box may be secured in position by two thumb tacks pressed through the box side and into the wall. Bridging strip of adhesive should not be omitted. Thumb tack method is most useful for walls to which sticky tape will not adhere.

There is another use for adhesive tape in wall drilling. If the location where holes are to be drilled is covered with tape (B) chipping of plaster around the hole will be limited. Where the quality of plaster is low, this application of adhesive is most valuable.—*C. T. Bowers, Tool Engineer, London, England.*



Removes Moisture From Air Lines

When air operated refrigeration doors were installed throughout our plant, it was necessary to pipe the air lines that operate the heavy units through rooms and areas where the temperature ranged down to 15 or more deg. below zero.

Moisture which condensed from the compressed air consistently froze in the lines, requiring gas torch thawing. The repeated freezing occurred in spite of moisture traps and separators in the compressed air system.

In order to prevent recurring freeze-ups we have employed a simple and inexpensive procedure.

First, a one gallon jar–(A) in sketch–with a screwed-on lid was obtained and filled ¾ full of common commercial alcohol.

Next, through a hole drilled in the jar lid a length of ¼ in. hose (B) was inserted to extend to the bottom of the container.

Then, a hole was drilled in the air compressor suction line and topped for a ¼ in. regulating valve (C), to which the hose was then attached. Finally, drilling another hole

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New Filler Bulletin Just Off the Press!

This new FMC Bulletin completely describes the eight basic M & S Fillers in this famous line. Specifications and illustrations of all models are included, along with detailed explanations of accuracy, operation, and construction features. Various attachments are also described, as well as graphic illustrations of their application in handling a wide variety of products.

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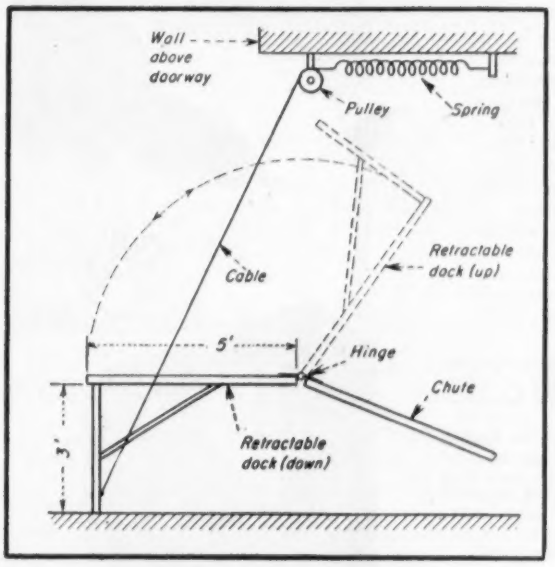
(D) in the jar lid to admit air completed the construction of the attachment.

Now, alcohol can be drawn into the compressor and pumped into the air lines, in just sufficient quantity to insure enough alcohol dissolved in the condensed moisture to lower its freezing point below that of the freezer rooms. No more frozen pipes.—*Paul Bodish, Operating Engineer, Fisher Art. Ice & Cold Storage Co., Dubuque, Iowa.*



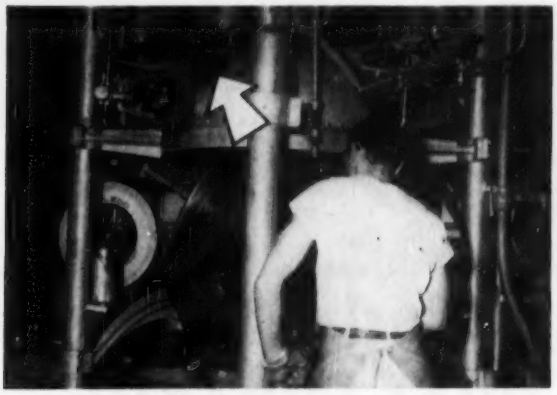
Builds Retractable Loading Dock

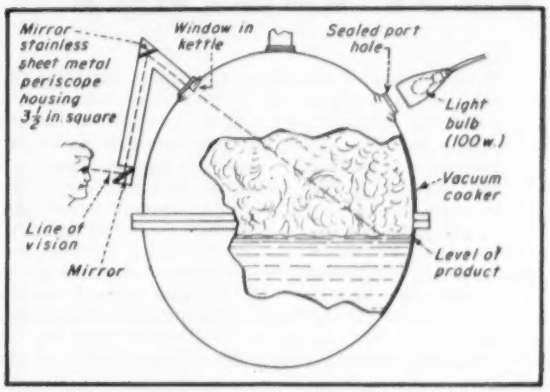
Installation of a homemade, retractable loading dock has proved to be the salvation to our cramped materials-receiving facilities. It permits traffic in a narrow alleyway in the rear of our plant when not in use.

This dock comprises a pair of 3 ft. angle iron legs, cross-braced at top and near feet. The legs are fastened to a heavy plank platform, measuring 3x5 ft. Angle-iron braces hold the legs rigid.

The front of this platform is hinged to the edge of wooden chute for support. When not in use, the dock is swung up on hinges so that it is out of the alleyway. A cable attached to one leg of the dock passes over a pulley hung from the receiving room ceiling and is fastened to a long 3-in. dia. spring. The other end of this spring is anchored, so it serves to keep the dock from striking the ground too hard when lowered. An extension of the crosspiece bracing the dock legs stops the dock in an upright position when it is pushed up out of the way.

From dock, barreled meats, for example, slide down the chute and onto a floor-level scale. This chute has two greased metal strips ¾ x 2 in. and 15 ft. long, spaced 8 in. apart to make barrels slide easily.—*Leonard P. Slotkowski, Slotkowski Sausage Co., Chicago.*





Periscope Sees Inside Vac Kettle

Quality control operations in hard candy processing at F&F Laboratory, Chicago, were slowed, especially in final stages of cooking, by the inability of the operators to view the inside of the elevated three-stage vacuum cooking kettle.

Sight glasses provided in the kettle's dome were well above eye level. And because of the structure of the equipment (see photo) it was not practical to install a platform to elevate the operator high enough to get a look through the sight glasses.

However, installation of a two-mirror periscope (sketch) now makes viewing easy for operators at any time. The 'scope is of stainless steel, 3½ in. square in cross-section, with mirrors angled at 45 deg. It is installed to provide operator eye level vision of interior.

With the inside of the kettle lighted by a 100 w. bulb suspended over one of the two 4-in. sealed portholes, it's possible for operations in the kettle to be viewed through the other port.—*F E Staff*

50 Years have changed a lot of things!

...including DUST CONTROL

To merely say, "Times Have Changed," regarding the stereoscope of Granddad's day and the TV of today would surely be an understatement. *Times Have Changed . . .* so have industry's methods.

Dust control methods have changed drastically during the past few years and we have played our part in changing them with a new concept, a new design in dust filtering. The DAY High Pressure, Reverse Jet Dust Filter manufactured under DAY and Hersey patents is a real departure from "yesterday's" type filter. The DAY advanced type Dust Filter is progress for industry. It saves valuable plant space because it requires a smaller unit to handle more dust laden air. It saves valuable time because it is pre-assembled at the factory and installation time is cut to a minimum. New facts about modern dust filtering are fully disclosed in a folder which is free to you. Write toDAY for Bulletin 528R.

THE DAY "AC" FILTER, using high pressure, reverse jet cleaning was introduced in 1949. This reverse jet multiple small tube filter brought to industry such advanced features as—square-to-round streamlined dust laden air inlets and multiple screw conveyor discharges. In 1954 DAY introduced the most important feature of reverse jet filters, the DAY Self-Adjusting Cleaning Ring. This cleaning ring makes better contact with the unstable filter medium to provide maximum cleaning efficiency with minimum filter wear. No other blow ring can clean filter tubes as effectively as the DAY Self-Adjusting Cleaning Ring.

DAY High Pressure Reverse Jet Filtering has been used by leading companies for 5 years. 87% of DAY Filter users have ordered additional DAY Filters. The DAY organization is nation wide and ready to serve you and counsel you on any dust problem. **Write for our Bulletin 528R.**

DAY SINCE 1881

Cutaway view of the DAY Dust Filter—available housed or unhoused—for use on either vacuum or pressure. (Licensed by H. J. Hersey, Jr.)

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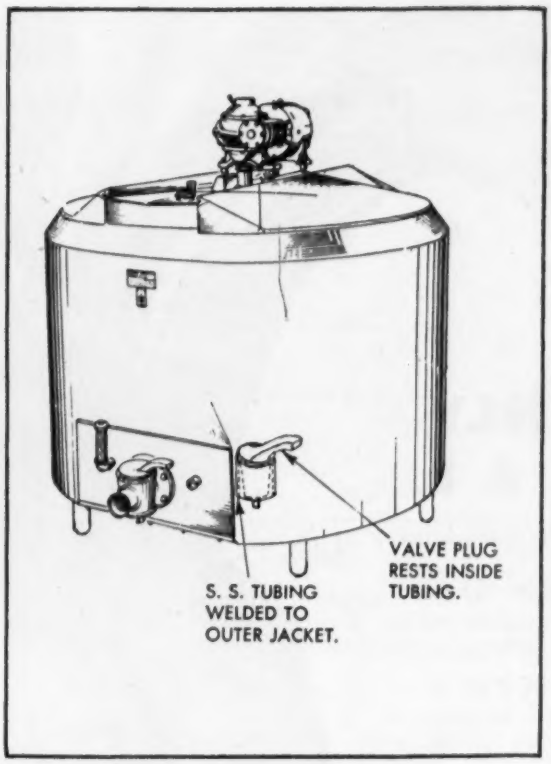
STOP AIR POLLUTION with DAY DUST CONTROL



Protects Plug Valve Surfaces

The problem of preventing knicking of the lapped-in surfaces on the plug of the outlet valve during wash-up and sanitizing period is helped tremendously by welding a 4-in. length of stainless steel sanitary tubing (see sketch) to the outer jacket at a point adjacent to the valve. (See sketch). The diameters selected should be large enough to readily receive the plug.

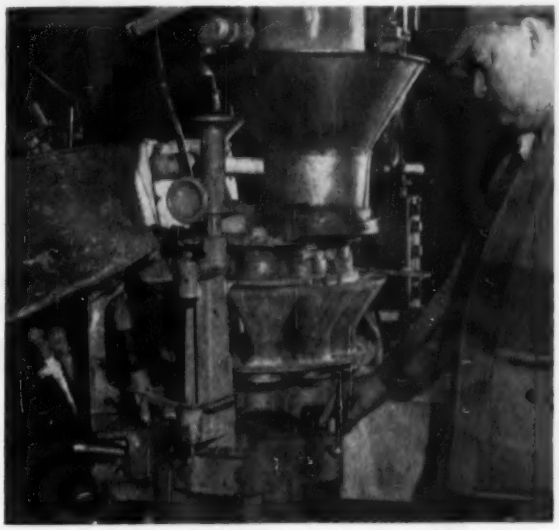
When ready to remove the plug from the valve, there will be a handy place to gently set it—where it will not be bumped and knicked around on the floor.—*Cherry-Burrell Circle, Cherry-Burrell Corp., Chicago.*

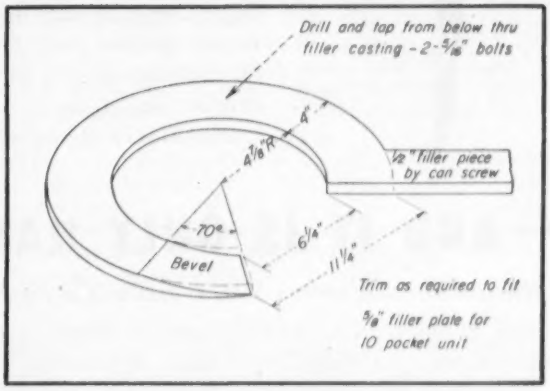
Colored Tape Is Handy Marker

Work-scheduling and production-control boards often require tags, tickets, or cards of different colors to distinguish the various phases of the work.

When the supply of these colored "tabs" runs short, or when the colored ones are not readily available, there is an easy out. Use white, and put a strip of ¾- or ½-in. colored tape across each. Tape in several bright, easily seen colors usually is available in local stores.

Color coding of pipes, wires, and machine parts to facilitate the work of operating and maintenance men also is readily done with bright-hued tape.—*FE Staff.*





Spacer Cuts Loss at Filler

Insertion of a specially designed spacer (see sketch) on top of the wear plates of a filling machine minimizes the space between the tops of the cans and the funnel (photo) during corn filling operations. This cuts product loss.

The plate is tapered near the discharge point on the filler so that the cans drop away from the funnels after the filling operation is completed.

So far, the savings have justified installation of the spacer device on nine fillers.—*"Nibletter," Green Giant Co., Le Sueur, Minn.*

CAN YOU USE $50?

Then here's an opportunity to get it.

Send one of your ideas to FOOD ENGINEERING.

Each month $50 is presented to someone like you for the best item in this department. And the chance that it will be you is now running about one in twelve.

Also, $5 to $15 is paid for each contributed item used. So a few minutes time may net you as high as $65.

Just send us the facts about your idea and its application. And include a free-hand sketch or snapshot to illustrate it.

We'll do the finished writing and drawing for you.

Send it today, before you forget. Address it to Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.—The Editors

JANUARY PRACTICAL IDEA WINNER was "Food Plant Uses of Furan Resins," submitted by Ray Cox, Research Manager, Bireley's Division, General Foods Corp., Hollywood, Calif.

IT WAS ONLY NATURAL

(sugar beets being a primary source of MSG)

that America's largest producer of beet sugar would eventually introduce its own brand of MSG. The Great Western Sugar Company, with the completion of its new modern plant, has all the natural facilities directly available for the production of mono sodium glutamate (MSG) of superlative quality,

—AND IT IS ONLY NATURAL

(now that Great Western's MSG is available to the food industry) that it will be accorded an enthusiastic reception by all those interested in the processing, preparation, and serving of good food.

Discover "The Secret of Good Taste." Try **MSG** *in: canned vegetables, meats, soups, poultry, seafood, sauces, gravies, seasonings, frozen foods.*

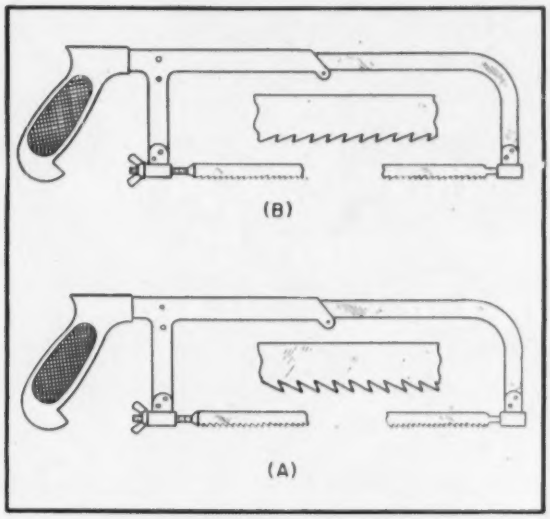
MSG
99+% Pure Mono Sodium Glutamate Crystals

A Product of
AMERICAN AGRICULTURE

We invite inquiries from current and prospective users of MSG

THE GREAT WESTERN SUGAR COMPANY
Denver, Colorado

For more information, use coupon on last page.



How to Saw Copper Tubing

Cutting tubing of soft metal is sometimes difficult. Not infrequently the saw binds on the far end of the cut—sometimes on both sides—slowing the operation or roughing edges of the cut surfaces.

If the saw blade is inserted in the holder with the teeth pointed toward the handle—(A) in sketch—instead of toward the point of holder (B), as normally placed, cutting through thin or soft tubing or pipe, such as of copper, will be greatly improved.—*Ralph S. Brown, The Brown Canning Co., Snow Hill, Md.*

Glue Reduces Bag Shifting in Cars

At the A. E. Staley Mfg. Co., Decatur, Ill., much of the former in-transit damage to products in both cloth and multi-wall bags is now prevented.

Bags are spot glued with an adhesive applied from a special dispenser (see photo) to each bag as loaded.

In conjunction with several manufacturers of adhesives, Staley's research department developed the glues. Two different types are dispensed, one for cotton and textile bags, the other for paper bags. Both afford great tensile strength and small shear strength but neither one penetrates through the bag cover.—*F E Staff.*

Keep Items Handy But Out of Way

Here's an idea for the handy shop storage of items seldom used but which are very important when needed. Just attach, with nails or screws, the lids of jars to a board and nail the board preferably in an elevated position. Next, place items in the jars and screw the jars into the lids (see sketch). Then they will be safely out of the way and yet available, readily located and also easily identified when needed.—*FE Staff*

Private Lobby Door

Locked doors through which company employees must pass involve much waste of time, also annoyance, if a key must be provided and used for their operation. A door connecting the reception lobby with the plant at Rubel Baking Co., Cincinnati, is frequently used by company employees. Yet, its location obviously indicates the advisability of keeping it locked.

Time and nuisance problems are neatly solved, however, by a buzzer locked on the door. The receptionist can see the door from her desk behind the "information" window, and a button within her easy reach releases the door catch whenever anyone entitled to use the door approaches it from the lobby.—*FE Staff.*

Dual Function Road Sign

Along the highways in the areas near Green Giant Company plants, road signs (see photo) not only serve as advertising reminders but also as markers for towns and villages. This is a worthy effort to establish good community relations. Also, this type sign serves to minimize the stigma of marring the scenic view frequently credited to roadside advertising.

Average consumers reduced their trips to the super market by 40% in the last 20 years

GEAR YOUR PACKAGING METHODS

to these CHANGING MARKETING HABITS

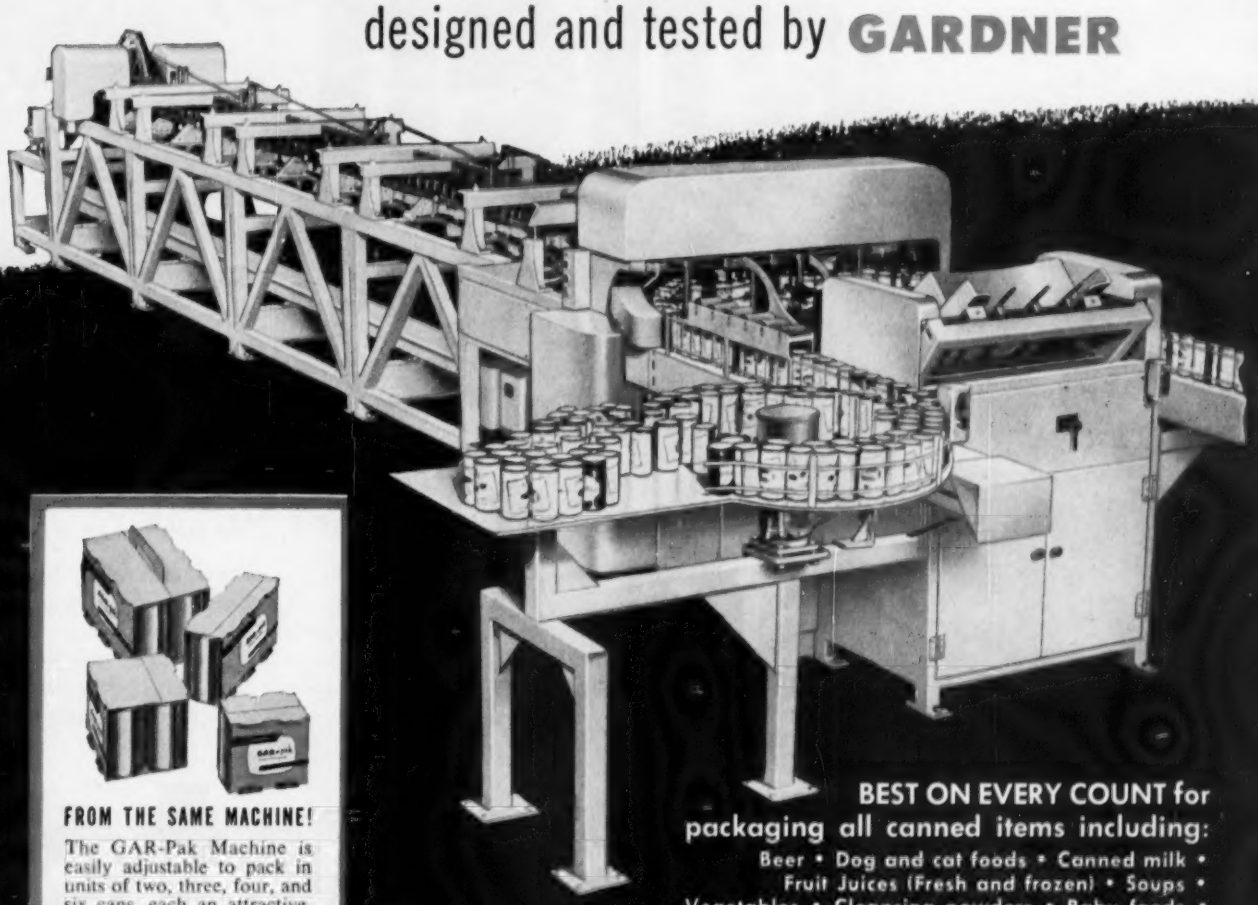
with this GAR-*pak** MULTIPLE CAN PACKAGING MACHINE

* Trade Mark

Follow the Volume-Trend to MULTIPLE CAN PACKAGING

with this simple, flexible, money-saving machine...

designed and tested by GARDNER



FROM THE SAME MACHINE!

The GAR-Pak Machine is easily adjustable to pack in units of two, three, four, and six cans, each an attractive, secure and convenient carrier, with or without a handle.

BEST ON EVERY COUNT for packaging all canned items including:

Beer • Dog and cat foods • Canned milk • Fruit Juices (Fresh and frozen) • Soups • Vegetables • Cleansing powders • Baby foods •

Developed and fully tested in our own plant, the GAR-Pak is now ready to simplify—at low cost—the multiple-unit packing of your canned items. Average operating speed, 500 cans per minute (83 six-can paks), easily adjustable to various can dimensions, all parts fully visible to the operator. Many other exclusive features – all designed to help you increase your share of the growing market for multiple can packaged items. WRITE! Further information will be sent at once.

MORE FACTS ABOUT THE GAR-PAK MACHINE at the National Packaging Exposition, Booths 126, 128, 130, 132, 227, 229, 231 and 233.

Many of America's greatest products go to market in "Cartons by Gardner"

GENERAL OFFICES: Middletown, Ohio—PLANTS: Middletown, Ohio; Lockland *(Cincinnati)*, Ohio
SALES OFFICES in Chicago, Cleveland, New York, Philadelphia, Pittsburgh, St. Louis, Greensboro, N. C.

THE GARDNER BOARD AND CARTON CO.

Manufacturers of Folding Cartons and Boxboard

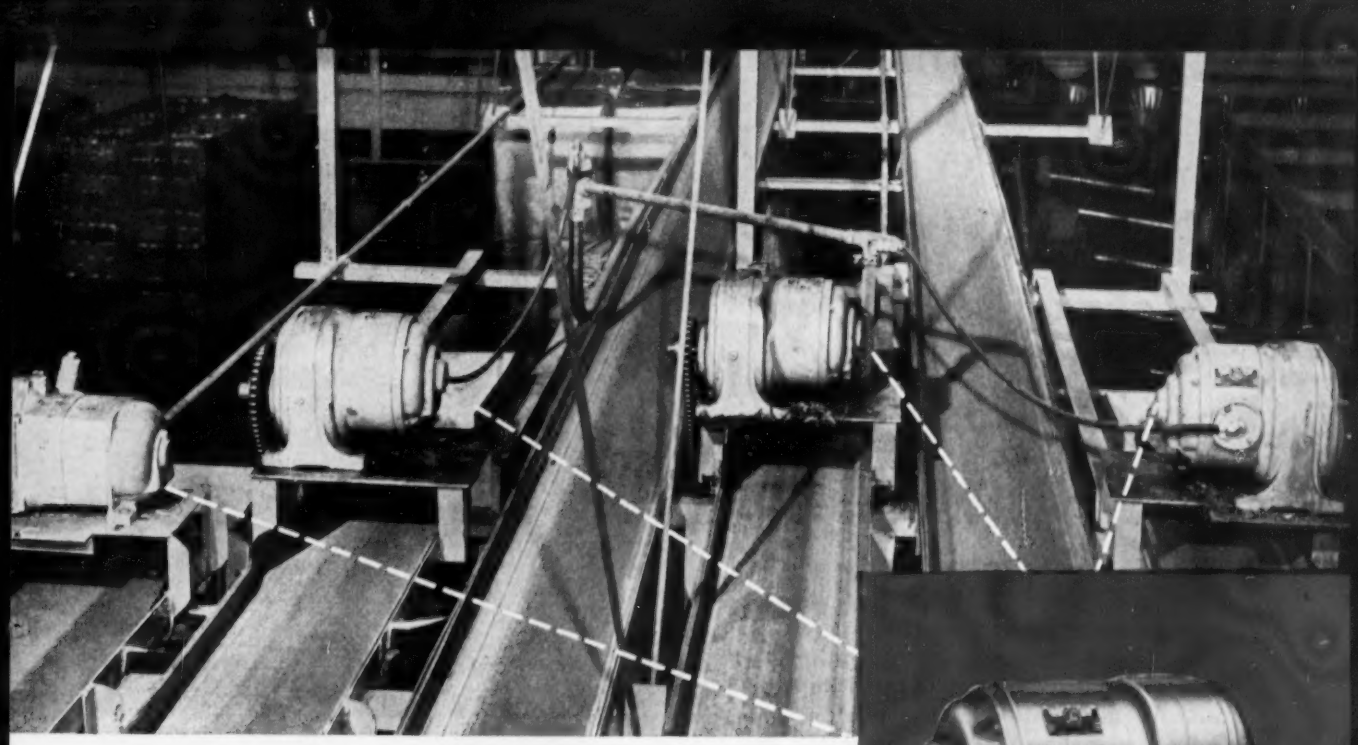
A FACT PROVED IN TENS OF THOUSANDS OF APPLICATIONS:

when Hancocks go in valve costs go down

MANNING, MAXWELL & MOORE, INC.
WATERTOWN 72, MASSACHUSETTS

MAKERS OF 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN-MICROSEN' INDUSTRIAL ELECTRONIC INSTRUMENTS, Stratford, Conn. 'CONSOLIDATED' SAFETY RELIEF VALVES, Tulsa, Okla. AIRCRAFT CONTROL PRODUCTS, Danbury, Conn. and Inglewood, Calif. "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES, Muskegon, Mich.

For more information, use coupon on last page.



STERLING SLO-SPEEDS DRIVE CONVEYORS AT PAULUS BROS. PACKING CO.

Over 185 installations of Sterling Electric Power Drives during the past 10 years at Paulus Bros. Packing Co. are giving outstanding service... rugged, compact Slo-Speeds assure minimum maintenance, require minimum installation space, and their streamlined design permits easy, efficient cleaning which is so necessary in a cannery, reports G. G. Perkins, Mechanical Superintendent at Paulus.

INDUSTRY NAMES SLO-SPEED PRODUCTION ADVANTAGES

In a nation-wide user survey of Sterling Slo-Speed Geared Electric Power Drives:

86% Lowered Maintenance Costs. **56%** Increased Plant Safety. **76%** Reduced Lubrication Requirements. **56%** Obtained Better Protection Against Outdoor Exposure. **46%** Required Less Installation Space. **40%** Achieved Greater Cleanliness. **10%** Reduced Power Costs. **22%** Increased Production. **56%** Simplified Installations. **32%** Improved Employee Morale. **12%** Achieved Quieter Operation. **38%** Modernized Equipment and Machines for Better Performance, Better Appearance.

Investigate the possibilities of bringing some of these Slo-Speed production advantages to your plant. Sterling Engineering Sales Offices and over 400 Distributors and Service Shops throughout the nation effectively serve every industrial, commercial and agricultural area.

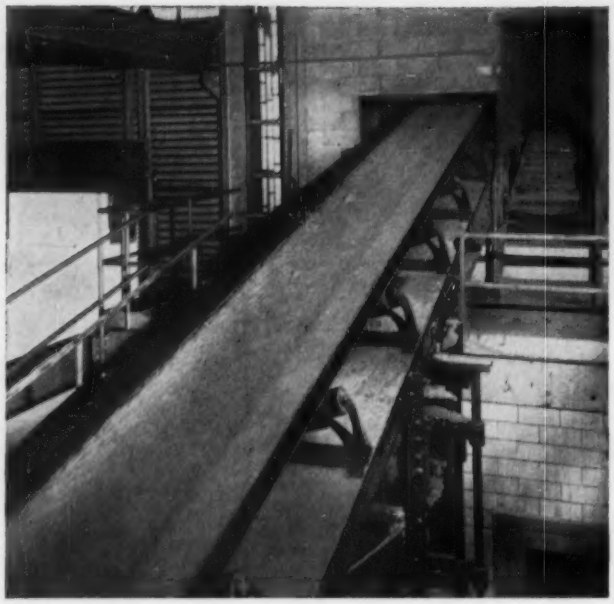
20-PAGE ILLUSTRATED CATALOG
Sterling Speed-Trol, Slo-Speed, Klosd and Klosd-Tite Electric Power Drives. Write for catalog No. **201.**

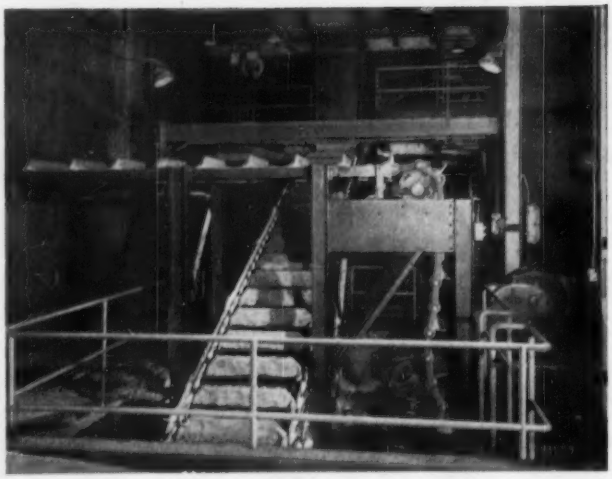
There Is a Sterling Electric Power Drive to Meet Virtually Every Requirement
Sterling Speed-Trol Electric Power Drives—for variable speed at its best
Sterling Klosd and Klosd-Tite Motors—for constant normal speed at its best

STERLING ELECTRIC MOTORS

Plants: New York 51 • Chicago 35 • Los Angeles 22 • Hamilton, Canada • Santiago, Chile
Offices and distributors in all principal cities

sugar moves fast, stays clean on JEFFREY BULK HANDLING SYSTEMS





Rapid transportation of raw bulk sugar without degradation of the product is a Jeffrey specialty. Whether you install one handling unit or an integrated handling system, Jeffrey can supply the correct equipment from its broad line of conveying machinery.

A modern conveyor system puts ease into your handling problems, and as an end result, sweetens your sugar profit. Two economical, efficient ways of transporting raw sugar on Jeffrey systems are shown here:

Jeffrey Belt Conveyors (top) handle large or small tonnages on level or incline and keep quality high along the way. Belt trippers or automatic plows can be furnished to divert the flow at any point.

Jeffrey Scraper Conveyors (bottom) carry sugar horizontally or up steep inclines; also retard flow on downgrade. For steeper inclines or vertical lifts, Jeffrey also has a complete line of bucket elevators.

Next time you modernize or replace any or all of your existing bulk handling system—or plan an entirely new plant layout—let Jeffrey quote on what you need!

From cane field to refinery, look to Jeffrey for handling and processing equipment for sugar, including:

Cane Shredders and Juice Strainers — **Sugar Minglers**
Carrier Chains and Slats — **Car Pullers**
Power Transmission Machinery — **Power Scoops**
Apron, Belt, Scraper and Spiral Conveyors
Standard Renewal Parts — **Bucket Elevators**
Vibrating Feeders, Conveyors and WAYTROLS

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED . . . IT'S A JOB FOR JEFFREY!

Best NEW Business? —the DIET SHOPPER!

She can't (or shouldn't) use sugar-sweetened products.
She knows SUCARYL—*she used it in her home.*
She'll buy (actually shop for) a SUCARYL*-sweetened line.*

Retailers are paying very special attention to dieters—shoppers who want *sweetness without calories* as part of their controlled diets. It's a live and sizable market.

SUCARYL is an entirely new substance—Cyclamate—that's remarkably adaptable to standard processing methods. It offers clean, sugar-like sweetness—without the bitterness or clinging, sharp taste of other synthetic sweeteners.

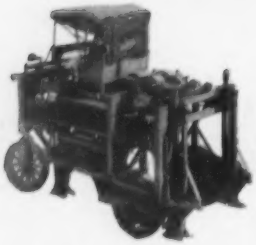
Timing couldn't be better for establishing your brand. For market facts, write for our free new SUCARYL booklet: Chemical Sales Division, Abbott Laboratories, North Chicago. Abbott

Stop the diet shopper with SUCARYL®

®Cyclamate, Abbott

For more information, use coupon on last page.

40 Years of Progress . . .



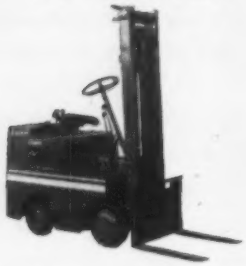
1914— **Carrier**

1919— **Trucktractor**

1923— **Truclift**

1924— **Duat**

1941— **Gas Clipper**

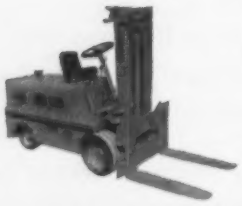


1942— **Electric Carloader**

1946— **Gas Trucloader**

1946— **Electric Trucloader**

1949— **Clarkette—5**



1950— **Dynatork Utilitruc—100**

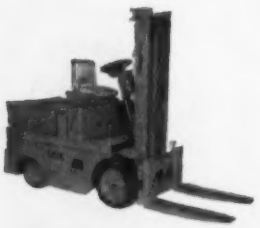
1950— **Yardlift—150**

1951— **Clarktor—120**

1953— **Yardlift—260**

1954— **Yardlift—200**

1954— **Clarktor—75**



1954— **Explosion-Proof Carloader**

Many of these machines were developed to meet specific customer requirements . . . and subsequently became the standard of entire industries.

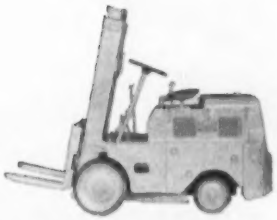
DEVELOPMENT • DESIGN • ENGINEERING

. making good machines better

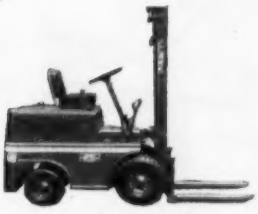
1928— **Tructier**

1928— **Clarktor**

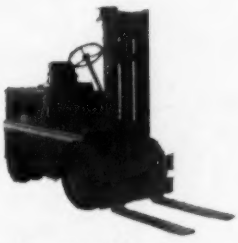
1938— **Gas Carloader**



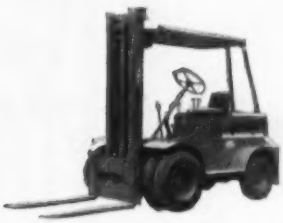
1939— **Gas Utilitruc**



1947— **Yardlift—20**

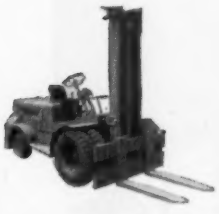


1947— **Yardlift—40**

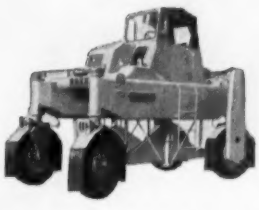


1948— **Yardlift—60**

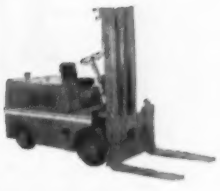
1948— **Dynatork Utilitruc**



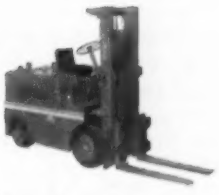
1952— **Yardlift—100**



1952— **Series 81 Carrier**



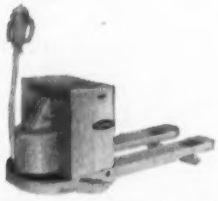
1953— **Hydratork Utilitruc**



1953— **Utilitruc (stevedoring spec.)**

1954— **Electric Clarkat**

1954— **LP Gas Carloader**



1954— **Powr' Hand Truck**

1954— **Yardlift 20 Scoop**

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 19, Michigan

APPLICATION • SERVICE

CLARK® EQUIPMENT

TRENTWELD
tubing gives...

**corrosion resistance*

**long service life*

**ease of cleaning*

**product protection*

in Lo-Temp Evaporator

This Mojonnier Lo-Temp Evaporator is designed to remove water from heat-sensitive liquid foods, pharmaceuticals and chemicals, at temperatures as low as 40F. Heart of the evaporator is made of nests of TRENTWELD stainless steel tubing.

TRENTWELD tubing is an ideal choice for this application. For TRENTWELD stainless tubing resists the corrosive attack of both the product itself, and the ammonia refrigerant pumped inside the tubing. And TRENTWELD stainless is inert . . . protects the product from contamination. But that's not all—TRENTWELD comes-clean with an absolute minimum of effort.

So when you have a tubing application check first with TRENT. You'll find the largest assortment of sizes and finishes in the industry . . . standard sizes from ⅛" to 40" O.D. — larger sizes on special order. And remember, TRENTWELD stainless and high alloy tubing are products of *tube mill specialists.* You can't buy better than TRENTWELD.

TRENTWELD

STAINLESS STEEL TUBING

TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN (Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA)

see THE WAUKESHA SANITARY P.D.* PUMP FOR ALL FOOD INDUSTRIES

Typical Waukesha P.D. Pump. Heavy-duty ball bearings carry balanced drive shaft loads . . . contributes greatly to long life and smooth, quiet action.

FOR PUMPING THESE TYPICAL PRODUCTS IN THESE INDUSTRIES

DAIRY
milk, cheese, ice cream

CANNING
baby foods, jams, jellies, soups, citrus and tomato juices

BREWERIES
beer, yeast, wort

BAKING
pie filling, dough, frosting

CANDY
fondants, fillings, chocolate marshmallow

BEVERAGES
syrup, soft drinks, wine, whiskey

Waukesha Positive Displacement Sanitary Pumps handle almost any type of food product in solution . . . from light, free-flowing liquids to heavy viscous products without damage to the product. The pump action is precise . . . closely timed; the product-flow is smooth and even—virtually without pulsation. The exclusive, simple Waukesha O-Ring Seal is safe . . . completely sanitary . . . completely seals out air . . . completely seals your product in. With a Waukesha Pump you can forget pump leakage problems.

For a solution to your food pumping problems, write to or consult with Waukesha application engineers. Waukesha Foundry Company, Dept. 3A, Waukesha, Wisconsin.

NOTE THESE OUTSTANDING FEATURES—

SANITARY
. . . simple to disassemble, wash, sterilize, and reassemble. The Waukesha O-Ring Seal completely seals out air . . . completely seals your product in.

CORROSION-RESISTANT
Manufactured from Waukesha Metal or Stainless Steel—completely corrosion-resistant. Metal will not react chemically with the product or contaminate the flavor.

DEPENDABLE
. . . for long, trouble-free life. No metal-to-metal contact in O-Ring Seal or in operation of impellers. Minimum of moving parts. Precision built.

POSITIVE DISPLACEMENT
. . . for smooth, even pumping action—no agitation, no pulsation, no aeration. Slow speed . . . positive displacement . . . no priming.

*Positive Displacement

Waukesha Foundry Company

For more information, use coupon on last page.

Satisfaction rests on the carton

Many great American companies . . .
among them, Anheuser-Busch, the brewers of Budweiser
. . . have found it good business to include Union among their
major corrugated container sources. Perhaps it would be equally
good business for you. Look into Union facilities
and experience. See how they can increase your
packaging and shipping efficiency.

TRADE MARK UNION
INTEGRATED PLANNING
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UNION BAG & PAPER CORPORATION

CORRUGATED CONTAINER DIVISION • Box Plants: Savannah, Ga., Trenton, N. J., Chicago, Ill.

Eastern Division Sales Offices: 1400 E. State St., Trenton 9, N. J. • Southern Division Sales Offices: P.O. Box 570, Savannah, Ga.
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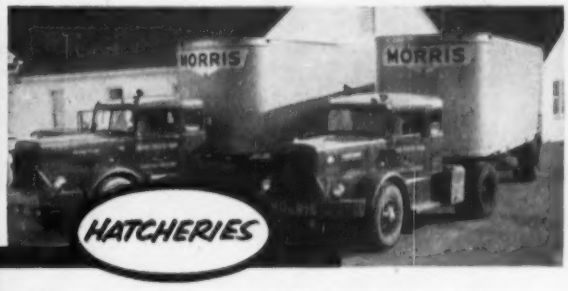
FOOD PROCESSORS OF ALL KINDS

Find Fruehauf Trailers Profitable!

The Barbara Ann Baking Company, Los Angeles, operates 7 Fruehaufs to ship bread and sweet goods to route truck depots throughout Southern California. The unit shown loads 19,800 one-pound loaves.

Esskay Quality Meat Products from the Wm. Schluderberg-T. J. Kurdle Company of Baltimore travel in Stainless Steel Refrigerated Fruehaufs. 140 quarters of beef fit into this unit, as well as hams, pork, frozen products.

Stokely-Van Camp, Inc., one of the largest food processors and canners in the country, has over 150 Fruehaufs hauling over 300 million pounds annually of raw and processed foods, including meat products, East of the Rockies.



Morris Poultry Farm, Inc., Bishopville, Md., transports hatching eggs safely and at controlled temperatures over Eastern coastal routes via Stainless Steel Fruehaufs. Trailers carry 570 cases of eggs, each case weighing 60 pounds.

The Capital City Products Company, Columbus, Ohio, utilizes Fruehauf Tank-Trailers to bring in vegetable oils used in margarine, salad dressing, and shortening. Low maintenance costs and top efficiency are the answer.

Marsh Foodliners, Inc., Indiana retail grocery chain, supplies its 22 super markets with the help of 5 Fruehauf Aerovans. Marsh began business in 1940, and has found Fruehaufs a big factor in its growth.

FRUEHAUF
TRAILERS
"ENGINEERED TRANSPORTATION"

FRUEHAUF TRAILER COMPANY, 10967 Harper Avenue, Detroit 32, Michigan.

- ☐ Please send the free booklet, "New Ways To Profit," showing Trailer applications in many businesses.
- ☐ Please send the newest, completely-illustrated free literature on Fruehauf's specialized Trailers for my business.
- ☐ Please have a Fruehauf salesman call at my office to discuss Trailer specifications for my shipping operation.

NAME_____

COMPANY_____

ADDRESS_____ CITY_____ STATE_____

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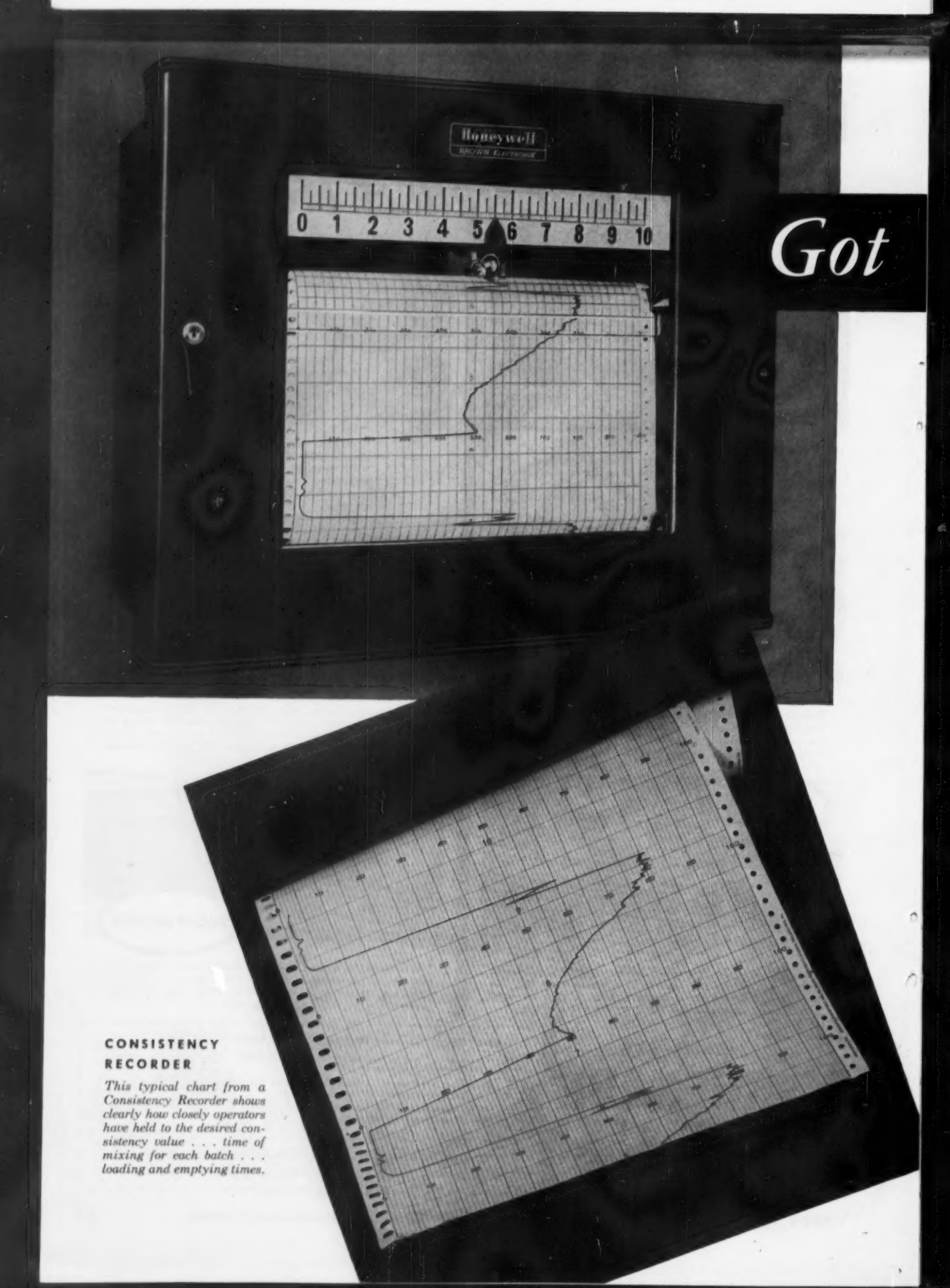

Got

CONSISTENCY RECORDER

This typical chart from a Consistency Recorder shows clearly how closely operators have held to the desired consistency value . . . time of mixing for each batch . . . loading and emptying times.

a mixing process?

here's an accurate, sensitive way to measure consistency

THIS unique idea in control may prove useful to you any time you have a problem of mixing a product to desired consistency. It's the *ElectroniK* Mixture Consistency Recorder, which continuously measures and records the consistency of the material you're working.

This instrument uses a novel but extremely simple principle. It measures the electric power required to drive the mixing machine's motor. When the consistency of the product increases, the drag on the motor increases . . . and so does the power taken by the motor. Motor input is thus related directly to product consistency.

Direct measurements of consistency are not only non-continuous, but also difficult and uncertain. The *ElectroniK* Consistency Recorder, however, *affords* a sensitive, readily reproducible qualitative index to this important variable. It gives the machine operator a reliable guide for supervising the mixing process . . . shows up abnormal variations, and tells him when processing is completed. And it provides management with detailed production chart that points out intervals between batches, shutdowns, loading and emptying times.

Instrumentation consists of a specially designed *ElectroniK* strip chart potentiometer, which works in conjunction with a Thermal Converter Unit. Both are rugged, precision-made components which have been used for years in other industrial measurement and control applications.

Your local Honeywell sales engineer will be glad to discuss how you can apply this instrumentation to your own mixing machines. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● **REFERENCE DATA: Write for Data Sheet No. 3.6-7**

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS

First in Controls

HEYDEN
SODIUM BENZOATE

Manufacturers of foods and beverages demand the highest purity in the Sodium Benzoate they use to protect the freshness and flavor of their products. Heyden has met this demand by making a uniform, high quality product matching table salt in purity. Modern specially designed equipment and close surveillance by research and control chemists maintain this high standard.

Sodium Benzoate and salt have much in common besides high purity. Both enhance food—a sprinkle of salt adds flavor and a minute amount of Benzoate protects against spoilage. Only 1/10 of 1% of Heyden Sodium Benzoate, added in processing, helps to safeguard the goodness of margarine, jellies, preserves, fruit juices, soft drinks, syrup, condiments and other food products.

Heyden Sodium Benzoate is supplied as U.S.P. Powder or Flakes in 100, 50 and 25 pound fiber drums. Technical grades are available for non-food uses.

Send for your copy of our new informative booklet on Sodium Benzoate today.

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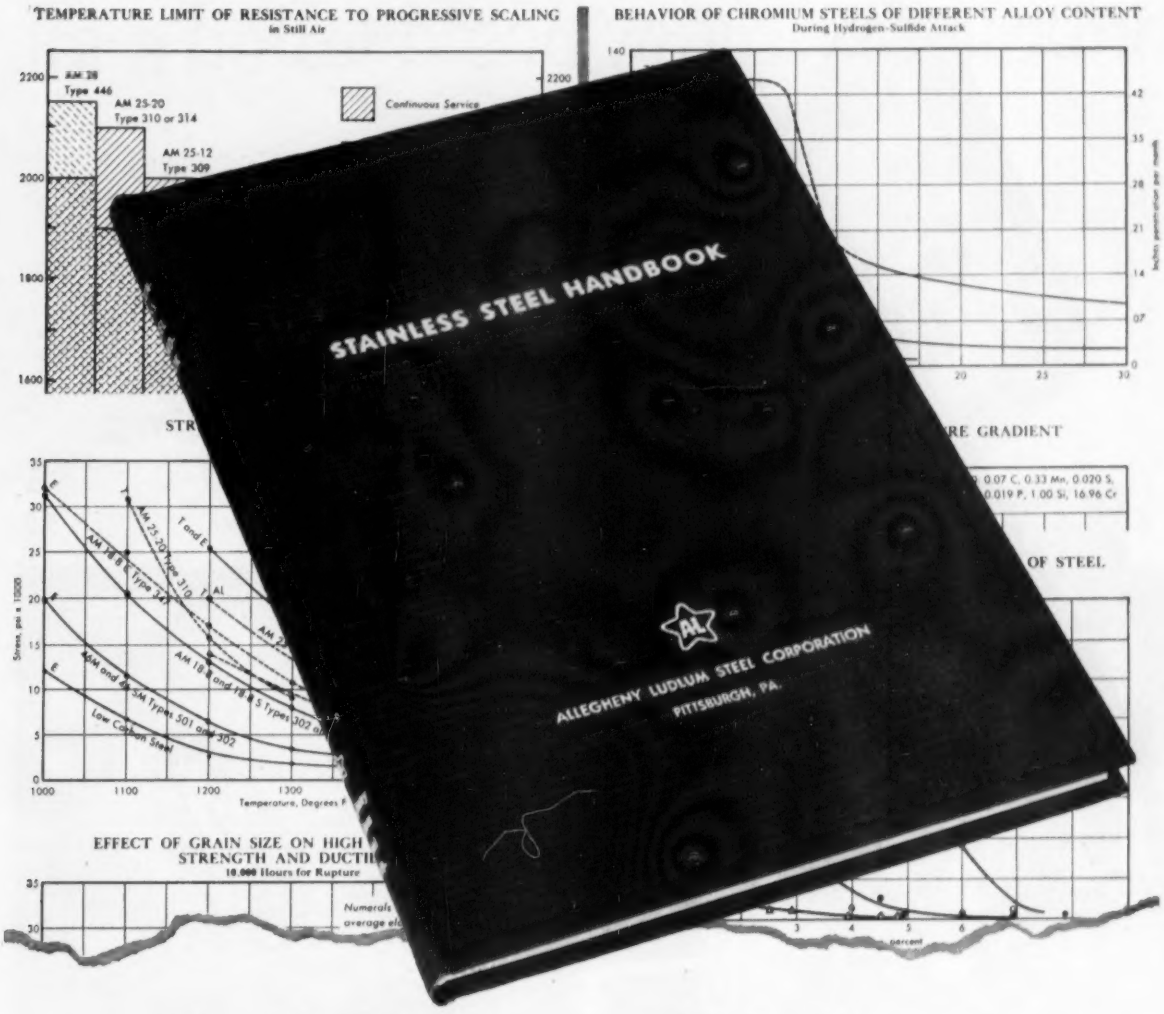

Here's 124 Pages of Valuable Data on STAINLESS STEEL

Stainless and heat resistant steel can usually be classed as a critical material, since it not only contains strategic alloys but is indispensable in many vital industrial and armament applications. It is always important, therefore, to make every pound go as far as possible.

The latest edition of our comprehensive 124-page, case-bound Stainless Steel Handbook is ready for distribution now. It will help you to select the right stainless steel and to use it properly. Comprehensive listings of analysis, properties and characteristics of each type will guide you in specifying grades that will do your job most efficiently. Clear, concise fabrication data will help you speed production and cut waste.

Your copy of the Stainless Steel Handbook will be sent—*without charge*—upon request. Our only stipulation: please make your request upon your company letterhead. ● Write *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.*

ADDRESS DEPT. FE-63

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WAD 8185

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AL® TIME-TESTED STAINLESS STEEL

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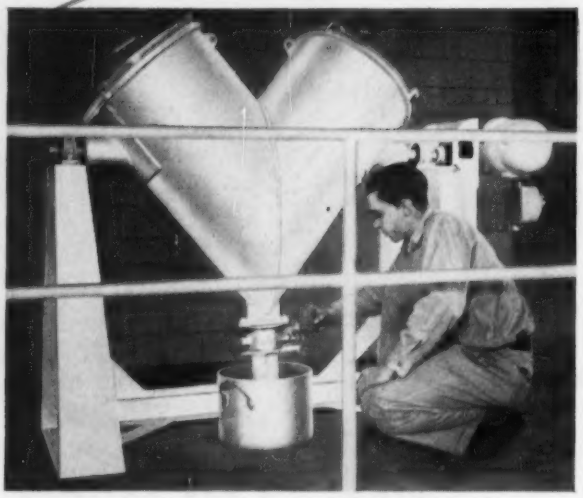
For good taste

For good health

For good blending

Vitamins
B_1, B_2, Niacin and Iron



Delicious Cream of Rice is a family favorite. Enriched with essential vitamins, it not only tastes good, but is good for you.

Thorough blending of vitamins is, of course, imperative. A **p-k** 5 cu. ft. stainless steel blender*, equipped with intensifier bar*, effectively blends four basic vitamins—niacin, thiamine, riboflavin and iron compound. This is another example where the food industry has selected the **p-k** twin shell blender to precision blend these important vitamins.

Loading is simplified by quick opening, dust-tight covers. Discharge is rapid, too, with the pre-blended vitamins emptied directly into containers for subsequent blending with the rice. Its smooth baffle-free interior facilitates clinical cleaning.

The application of **p-k** twin shell dry blenders to your particular processes will assure efficient blending at low cost. Why not pre-test your materials in **p-k**'s special blending laboratory. Send a sample of your materials for a thorough blending analysis, or write for catalog 12, no obligation.

* patented

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Colors come brighter, your wrapper is more brilliant with A-C POLYETHYLENE. And because the gloss lasts longer at room temperatures, your bread wrapper is more attractive, more "alive" for longer periods. And it has greater sales appeal.

Improved toughness

By up-grading wrapper waxes, A-C POLYETHYLENE imparts greater scuff resistance to the paper. The wrapper is tougher and can better resist handling from wrapping machine to shopping basket.

Send the coupon for additional information and for samples of paper coated with blends of A-C POLYETHYLENE.

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Allied Chemical

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☐ Have a technical service representative call on me.

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CITY _____ ZONE _____ STATE _____ FE-3

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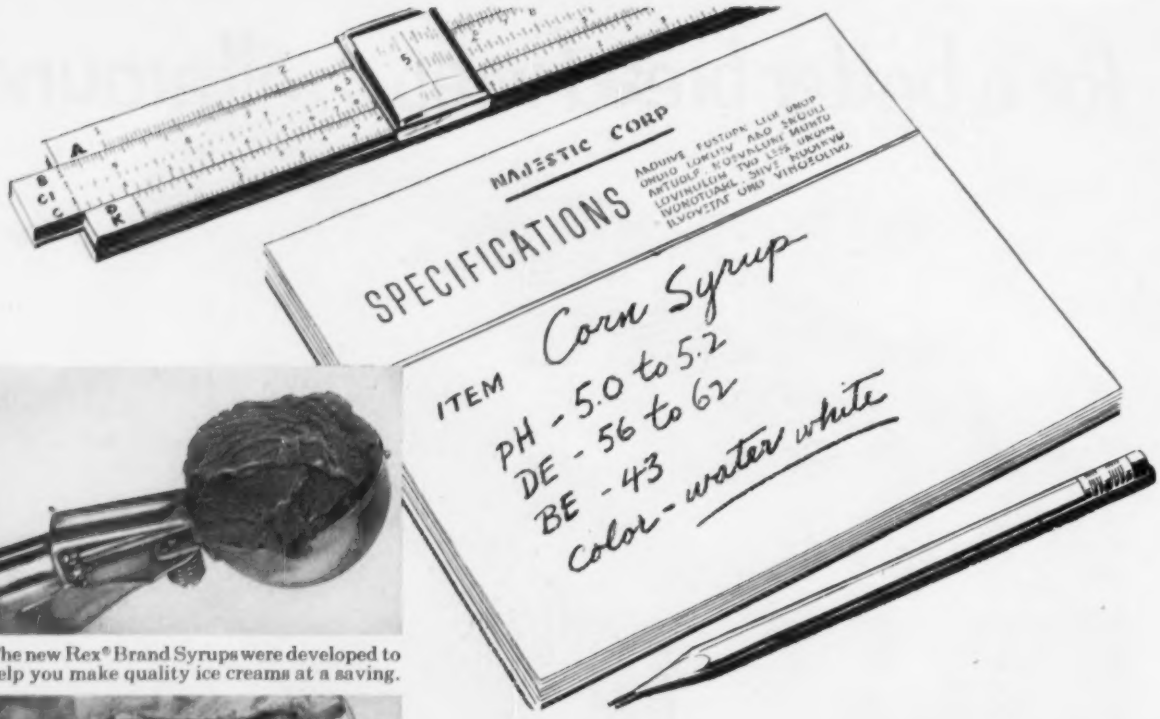
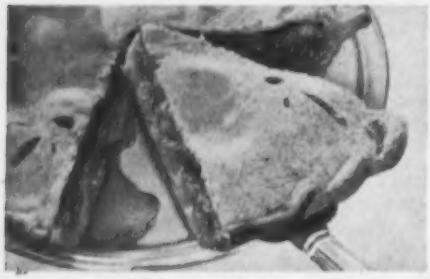


The new Rex® Brand Syrups were developed to help you make quality ice creams at a saving.



You retain the sparkle, color and flavor of pure fruit with Rex or Globe Corn Syrups.

Globe Corn Syrups are without peer in purity, clarity and efficiency as a "doctor". Their inverting power is closely controlled.

The uniformity, clarity and sparkle of Globe® Brand Corn Syrups enables you to maintain constant high product standards.

CORN SYRUP

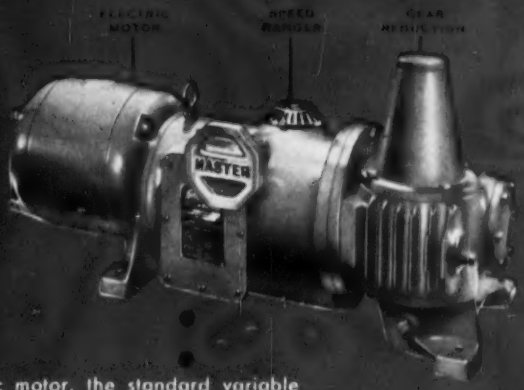
...tailor-made for your specific need!

Modern corn products technology has developed accurate control of product uniformity and performance. A complete range of corn syrups is available to you from the world's prime producer of corn products. Nor does the service stop there.... We are constantly seeking new variations to offer.

A large staff of scientists and field experts is constantly at work developing products and techniques for your particular industry. The Technical Staff welcomes an opportunity to help you solve your current production problems. There is no charge or obligation on your part, of course. Write today.

A complete range of corn syrups, tailored to meet your most exacting specifications

CORN PRODUCTS REFINING COMPANY
17 Battery Place, New York 4, N. Y.



See how easily the standard electric motor, the standard variable speed unit and the standard gear reduction combine into a drive that gives the RIGHT horsepower, the RIGHT shaft speed, the RIGHT features . . . all in one compact unit. Nowhere else will you find power units that are so flexible, so easily adaptable, and in such a wide range of types and ratings.

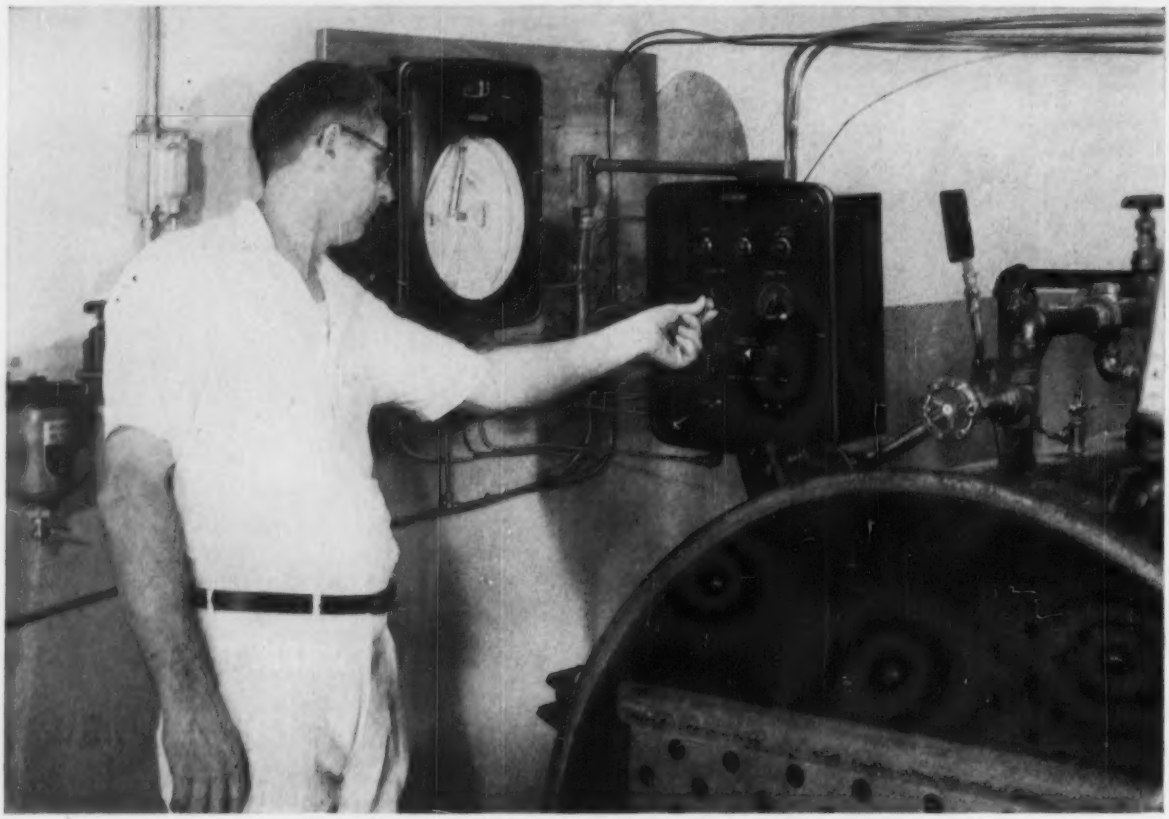
Master power drives are available in thousands and thousands of ratings (⅛ to 400 HP) . . . in open, enclosed, splash proof, fan cooled, explosion proof . . . horizontal or vertical . . . for all phases, voltages and frequencies . . . in single speed, multi-speed and variable speed types . . . with or without flanges or other special features . . . with 5 types of gear reduction up to 430 to 1 ratio . . . with electric brakes . . . with fluid-drive . . . with mechanical or electronic variable speed units . . . and for every type of mounting . . . Master has them all and so can be completely impartial in helping you select the one best power drive for you.

THE MASTER ELECTRIC COMPANY • DAYTON 1, OHIO

standard units easily combine into special purpose drives

HOWARD JOHNSON'S

steps up Versatility of Retort Operation . . .



Operator at Howard Johnson's home plant in Wollaston, Mass. simply sets desired retort cooking program on the Foxboro Add-a-Unit sub-panel — flicks switch for automatic cycle. Controller at left regulates and charts temperature and pressure.

. . . with Foxboro Automatic Add-a-Unit Control

Maintaining uniform, high product quality of more than 30 types of foods and sauces at Howard Johnson's, Wollaston, Mass., requires highly accurate retort control, readily adaptable to the various cooking schedules. This famous processing plant decided that the semi-automatic control they were using just wasn't flexible enough. A year ago, a fully automatic Foxboro Add-a-Unit Controller was installed.

The retort operator merely "dials" whatever control he needs — temperature, pressure, cooking time, start of cooling, cooling time, venting, draining. The Controller automatically carries out the desired cycle . . . duplicates it precisely whenever the same product is processed.

Add-a-Unit Control is completely adaptable to *your* requirements. First, install the basic Foxboro Retort Controller for temperature or temperature-and-pressure. Then, when you need them, additional control functions can be added in compact units — up to completely automatic operation. It's simple, accurate, economical. Write for details.

THE FOXBORO COMPANY, 303 NEPONSET AVE., FOXBORO, MASS., U. S. A.

FOXBORO
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Add-a-Unit
Retort Control

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

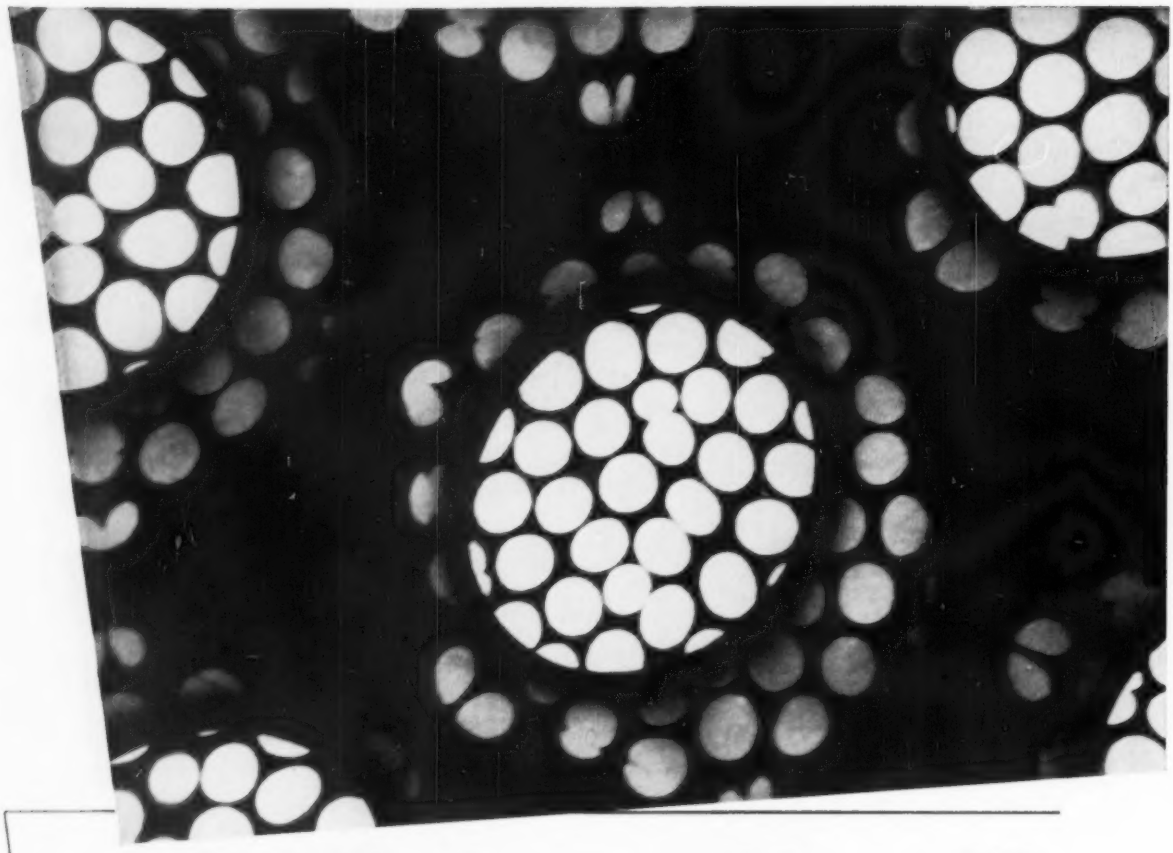
YOUR SALES START ROLLING HERE

Top quality printing reproduction *is the key to sales success, because a sparkling, outstanding wrapper will build the sale of your product.*

Western Waxed has the finest, most modern, and widest range of printing equipment—rotogravure, letterpress and flexographic. This means that we can offer you the best printing reproduction in the process most suited to your needs, to give you the brightest, most appealing package.

another reason why Western Waxed packaging materials are the best

WESTERN WAXED PAPER
DIVISION CROWN ZELLERBACH CORPORATION



22,000 times as big as life

to show one why of Dicalite's "sharp" filtration

This electron micrograph of one of the more than 10,000 kinds of diatoms shows clearly the delicate, yet rigid, "skeleton" whose lace-like grid helps make diatomite such a superior filteraid. Imagine, for a moment, millions of these diatom frustules—needle-, disc- or boat-shaped—piling up strawpile fashion in the filter pre-coat or filtercake . . . then visualize bacteria or other sub-micron sized solids (enlarged to the same scale) coming against this barrier. Now, in your mind's eye, you can see clearly how the diatomite "grillwork" catches and holds all solids, while the fluid being filtered flows rapidly on through the billions of tiny channels which make up 90% of the filtercake's bulk.

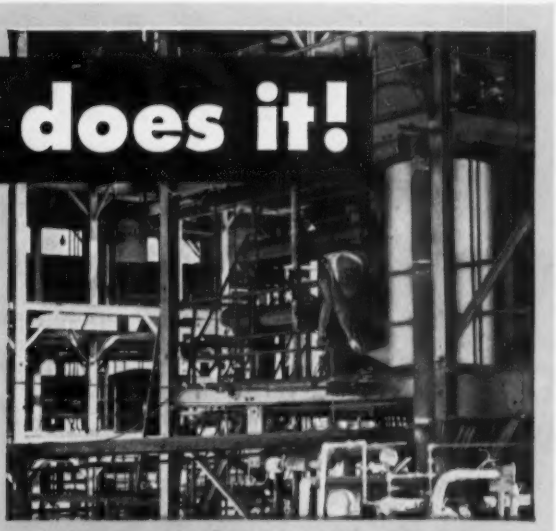
This explains why Dicalite filteraids have proven so successful in the processing of many food products. In hydrogenated oils, for example, Dicalite removes every trace of such unwanted colloidal solids as activated carbon and de-colorizing clays. Every trace of the nickel catalyst is trapped in the Dicalite filtercake, and is easily reclaimed for further use. Dicalite is sterile, insoluble and chemically-inert, and causes *no* color-reversion with the grades of Dicalite usually employed in food processing. If you have a filtration problem, either as respects clarity or throughput, a Dicalite engineer will be glad to advise with you, with no obligation whatever . . . just write us.

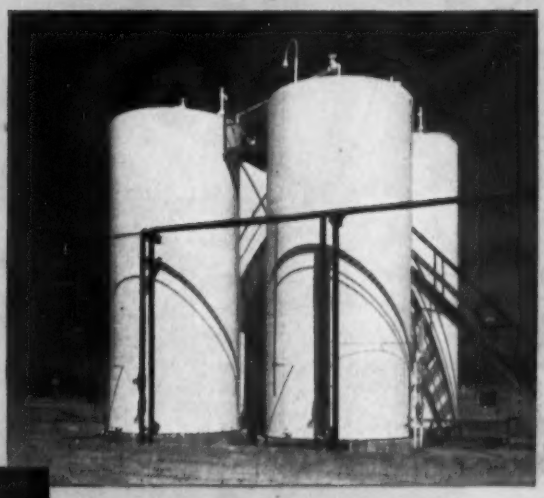
Dependable GLC GREAT LAKES **Dicalite**® DIATOMACEOUS MATERIALS

DICALITE DIVISION GREAT LAKES CARBON CORPORATION • 612 S. FLOWER ST., LOS ANGELES 17, CALIFORNIA

EPON® RESIN does it!

New paint lasts years ...resists corrosive spillage at Diamond Alkali plant





HERE'S HOW...

PAINT LEADS a hard life at the Diamond Alkali Company agricultural chemicals plant in Houston, Texas . . . and no ordinary paint can survive there for long!

A few reasons for paint failure: Processing vessels and storage tanks are subjected to spillage of chlorinated hydrocarbons and benzene, and some also to heat. In parts of the plant, painted surfaces are exposed to the highly corrosive fumes of hydrogen chloride and sulfuric acid.

In their search to find a tougher, longer lasting paint, Diamond Alkali maintenance men tried coatings of many types, including heavy duty maintenance finishes. Some "washed off" immediately; some lasted 6 to 8 months. Finally, Epon resin coatings based on the XA-200 formulation were tried — and found outstandingly successful.

The Epon cold-cured paint, applied by spraying throughout the entire plant, has been in service for *more than two years with no failure.* Painting costs — for both material and labor—are a mere fraction of what they formerly were, reports Diamond Alkali.

Call on our sales offices for names of suppliers who sell Epon resin coatings for your needs. Write for the full Epon coatings story in the new brochure, *"Planning to Paint a Pyramid?"*

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. . . in any plant . . . for any industry.

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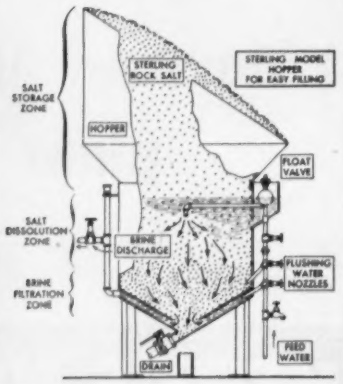
THE STERLING MODEL
LIXATE
ROCK SALT
DISSOLVER



THE STERLING
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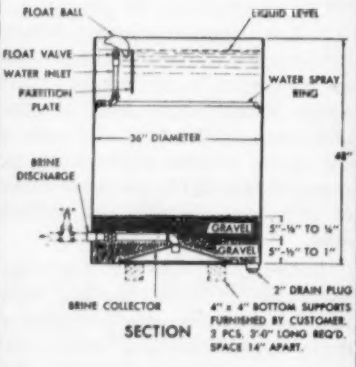
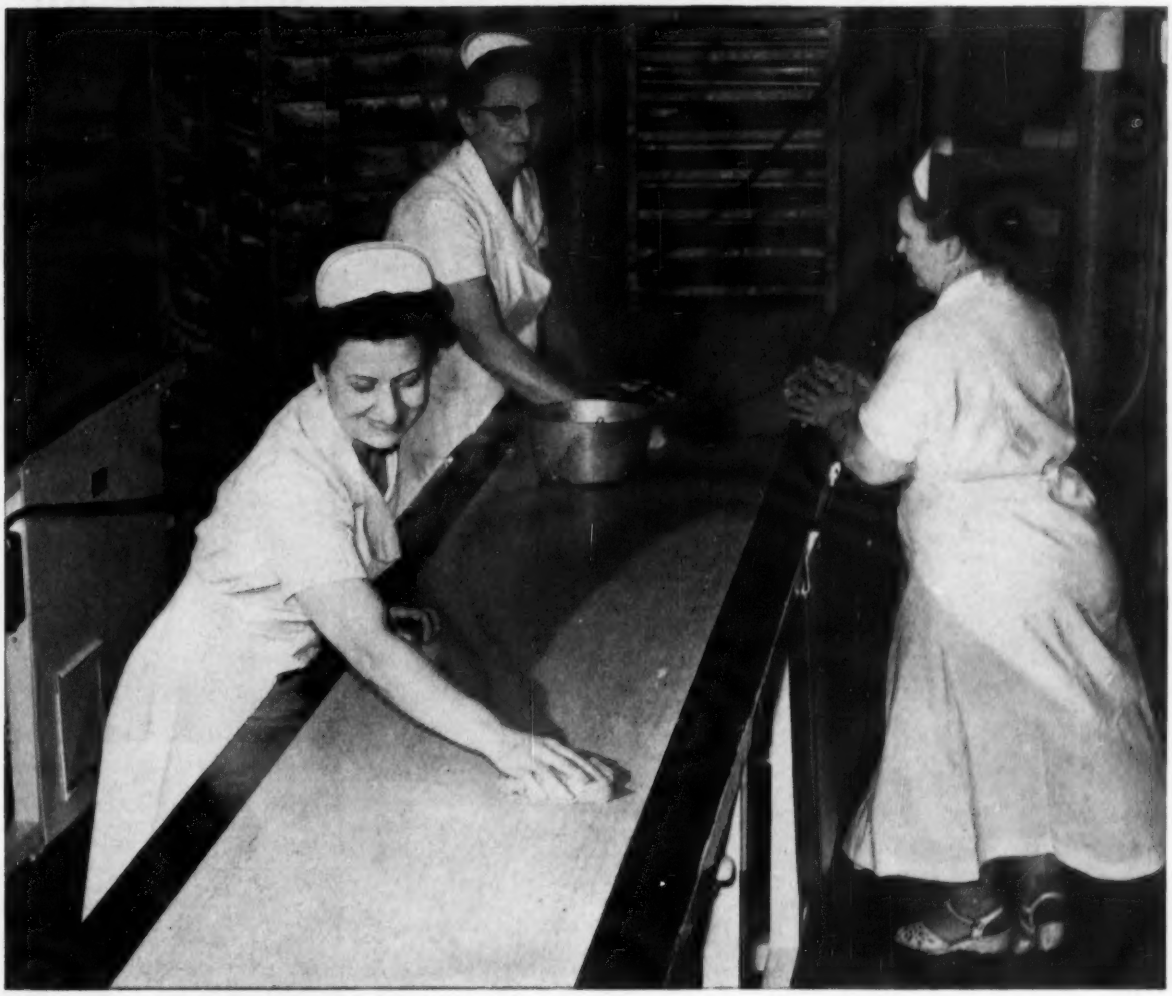


SECTION

B. F. Goodrich announces



Koroseal belt washes like glass, cuts cleaning time in half

STICKY icings, jelly, most stains wipe right off that belt with just a damp cloth. That's because it's made of Koroseal, the flexible material developed by B. F. Goodrich.

The Koroseal belt has a smooth, polished surface that even oil can't penetrate. Food particles can't grind in. So there's no need to scour it. A few seconds with a damp cloth and the Koroseal belt is clean and looks as new as the day it was put on. No wonder users say it cuts cleaning time in half. And since Koroseal is completely, permanently waterproof, the belt cover never gets damp or soggy, and so can be used right after washing.

Koroseal resists cracking and peeling, doesn't get sticky. And there's no danger of contamination with Koroseal because it is nontoxic, and has no odor or taste to transfer to foods. With its high resistance to cooking oil, animal fats, and most acids, the Koroseal belt is ideal for bakeries as well as places where meats, nuts, greasy pans are handled.

Two other belts, developed by B. F. Goodrich for food handling, are called Highseal and Kleenseal and are made of new types of rubber compounds. Their "sight-saving" green color reduces glare and eyestrain on packaging and inspection lines.

It will pay you to find out more about these work-saving, money-saving improvements in food handling. First step is to have your BFG distributor survey your belting needs and recommend the right B. F. Goodrich belt for your process. If you don't know the distributor nearest you, write us and we'll send his name. *The B. F. Goodrich Company, Dept. M-380, Akron 18, Ohio.*

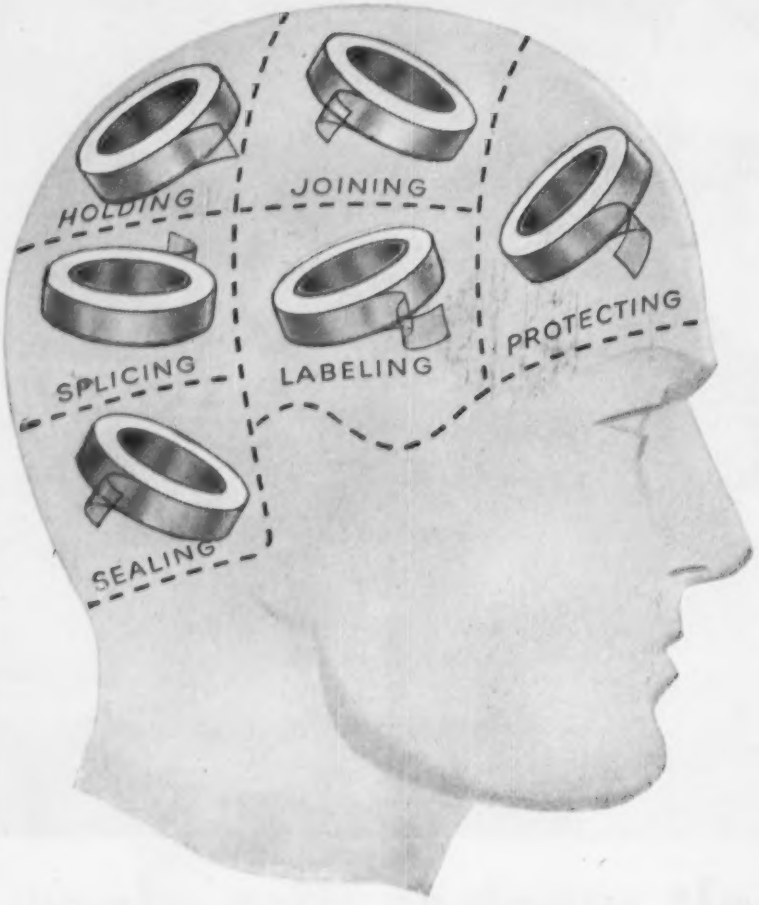
Koroseal—T. M. Reg. U. S. Pat. Off.

B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

For more information, use coupon on last page.

When you think of saving...

Think of TAPE!



Famous "Scotch" Brand Cellophane Tape is a time-saving, money-saving tool all over the plant! Remember, it's crystal clear and sticks at a touch—tighter than ever before. Use it for holding, joining, protecting—any of a thousand different jobs. Tape does it faster, better, cheaper! For more information, write on your letterhead to Dept. FE-35.

CELLOPHANE TAPE...ONE OF 300 PRESSURE-SENSITIVE TAPES for industry, trademarked...

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SCOTCH BRAND

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3M

LOOK what you can do with it!

NEAT PACKAGING of irregular shapes is easy with "Scotch" Brand Cellophane Tape. This meat-packing example shows how well tape performs on refrigerated package.

ADD PREMIUMS to regular shelf packages quickly, easily, inexpensively. This tape-of-all-work sticks at a touch to any clean, dry surface — holds securely in transit and on shelves.

CARTON CLOSURES that *stay* closed are easily applied. Example: sealing bulk packages of butter pats with clear-as-glass "Scotch" Brand Cellophane Tape. Tape doesn't hide printed message; holds cover securely.

AIR-TIGHT SEAL keeps potato chips fresh and saleable for long periods—one of the hundreds of profit-making, money-saving uses for versatile "Scotch" Brand. Got a packaging problem? Think first of *tape*.

Now... they're even PUMPING POTATO SALAD!

An example showing how the versatile MOYNO® PUMP may solve your pumping problem

As you can imagine, any conventional pump would quickly make *mincemeat* out of potato salad! But not the versatile MOYNO Pump! In fact, this unique pump was the answer to a years-old materials handling problem in an Eastern food processing plant.

Why? Because of the Moyno "*progressing cavity*" *principle*—found in no other pump. Instead of valves and pistons that stick, or vanes that cause churning and turbulence, the Moyno has a simple rotor, operating within a stator. The small illustration shows how progressing cavities are formed as the rotor turns. These cavities move along smoothly, without closing up or squeezing the material. That's why Moynos carry liquids, pastes, solids in suspension, abrasive-laden slurries—*almost anything that will go through pipe*—with positive, non-pulsating pressure!

Potato salad is only one of the many successful, dramatic applications for Moyno Pumps. You may be able to save money or solve a problem by finding out more about the world's simplest, most versatile pump!

If you have a pumping application—in your plant or in your product—write today for free copy of Bulletin 30-FE. It will give you complete facts!

Features of the MOYNO that may solve YOUR pumping problem

Positive Displacement—Moynos are available to pull up to a 29″ vacuum while discharging under pressure. Big Moynos deliver up to 250 g.p.m. at pressures to 600 p.s.i.

Gentle—no churning; won't break up semi-solids . . . won't aerate liquids.

Reversible—pumps with equal efficiency in either direction.

Trouble-Free—self priming; won't cavitate or vapor-lock. Just one moving part—no valves to stick, no pistons to gum up. Built for tough service. Easy to maintain.

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Processing...ON THE "BEAM"

THE "WALKING BEAM" OF THE *B-W VORTEX*

Protects Your Processing Reputation

This unique B-W conveyor is simply a series of stainless steel strips, mounted on two grates, and running lengthwise through the machine. By alternately raising each grate and moving forward, lowering and returning to their original position, they carry containers.

As it moves containers through the Vortex, the "walking beam" does not itself change temperature. There is no chain to require reheating or recooling in traveling through processing zones. Since the conveyor is in a sense, stationary, there are no moving parts to maintain or lubricate.

Operation is entirely automatic and continuous. Infinite speed and temperature adjustments are provided to meet varying process requirements . . . assure perfect control of your product's quality.

The "walking beam" conveyor, trouble-free hydraulic drive and the atomized spray system combine to produce the finest results at a minimum of operating and maintenance expense . . . whether used to heat, cool, freeze, pasteurize or exhaust.

For full information and technical bulletins, write:

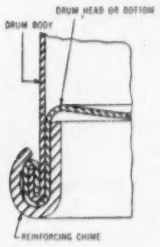
338

BARRY-WEHMILLER MACHINERY CO.

4660 West Florissant Avenue · Saint Louis 15, Missouri

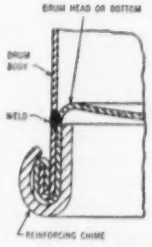
Here are important features that mean big savings with USS Stainless Steel Drums and Pails

USS Stainless Steel Drums are available with durable rubber rolling hoops (as illustrated) that give extra protection to both the drum and its contents from bumps and shocks, prolong the life of the drum, make handling much easier and quieter, and keep the drum from marking and marring floors.



CONVENTIONAL DOUBLE SEAMED REINFORCED CHIME CONSTRUCTION

Our special patented construction seals off the inner crevice or opening that usually results from the conventional double seam construction. This prevents the contents of the drum from entering the double seam and being trapped within the crevice, making it easier to do a thorough cleaning job.



CONVENTIONAL CONSTRUCTION WITH CREVICE CLOSING WELD

* * *

United States Steel Products fabricates stainless, galvanized, tinned, painted and decorated drums and pails . . . furnished in a wide range of capacities and with a variety of fittings and openings to meet every industrial need. If you would like any additional information on USS Steel Drums or Pails, just write to us at New York.

1. USS Stainless Drums and Pails give you many times the length of life of drums and pails made of conventional carbon steel because of greater tensile strength, extra durability.
2. USS Stainless Steel Drums and Pails are returnable, can make many trips, reducing considerably the unit cost of your shipping containers.
3. USS Stainless Steel Drums and Pails give complete product protection during shipping or storage . . . stops worry about contamination from rust, scale, grease or dirt.
4. USS Stainless Steel Drums and Pails stay clean and new looking inside and out. This is important in promoting customer confidence. And products that require sanitary containers are dependably safe in USS Stainless Steel Drums and Pails.

These containers are available in both tight and removable head construction.

"It's Better to Ship in Steel"

UNITED STATES STEEL PRODUCTS
DIVISION

UNITED STATES STEEL CORPORATION
DEPT. 635, 30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
Los Angeles and Alameda, Calif. · Port Arthur, Texas
Chicago, Ill · New Orleans, La. · Sharon, Pa.
*Camden, New Jersey

*Expected Completion in April 1955

USS STEEL DRUMS

UNITED STATES STEEL

For more information, use coupon on last page.

how to bring a salesman right to the shelf!

Three of the many groups of foods and beverages that are increasing sales through

You can give your carbonated beverage health appeal for just a *fraction of a cent* per bottle. That's all Pfizer vitamin-fortification costs. Bottlers are already using Vitamins B_1 and C as successful sales boosters to today's vitamin-conscious public. Vitamin B_{12}, a factor in child growth, is also being considered. Pfizer will be glad to work with you in fortifying your beverages.

It's a smart sales move to enrich flour, macaroni, corn meal and similar products with Pfizer BI-CAP® enrichment concentrates. They give such products more *food value.* This meets the increased demand for foods of all varieties in the diet that contribute to good nutrition—*regardless of calorie count!* Let Pfizer show you how BI-CAP can add sales appeal to *your* product.

A vital "plus" to help you sell your product in today's self-service food store

The grocery shelf on which your product stands is the point of *decision* for the consumer. Your package, your product and its ingredients are the main selling forces employed at that point in the all-important job of making that consumer put *your* brand in her shopping cart. And that's where Pfizer's vitamin fortification and enrichment program can become a "star salesman" for your product! For extra vitamin sales-appeal displayed on your package aims right at the basic desire of every shopper to give the family maximum nourishment. Your Pfizer sales representative is the logical man to see for the full story on how Pfizer vitamins, at nominal cost, can substantially increase your product's sales potential. He's backed by over 18 years of Pfizer vitamin experience in working with manufacturers of many types of foods and beverages. It's truly worth your while to talk to him.

Pfizer vitamin fortification and enrichment

To fortify your sales position in the canned juice, concentrate and fruit "ade" market, fortify these products with Pfizer vitamins. Health is a prime reason why people drink fruit juices. "Vitamin Fortified" on your label is a strong inducement to buy *your* brand. What's more, your vitamin content is standardized, offsetting processing losses and seasonal variations.

CHAS. PFIZER & CO., INC.

Chemical Sales Division

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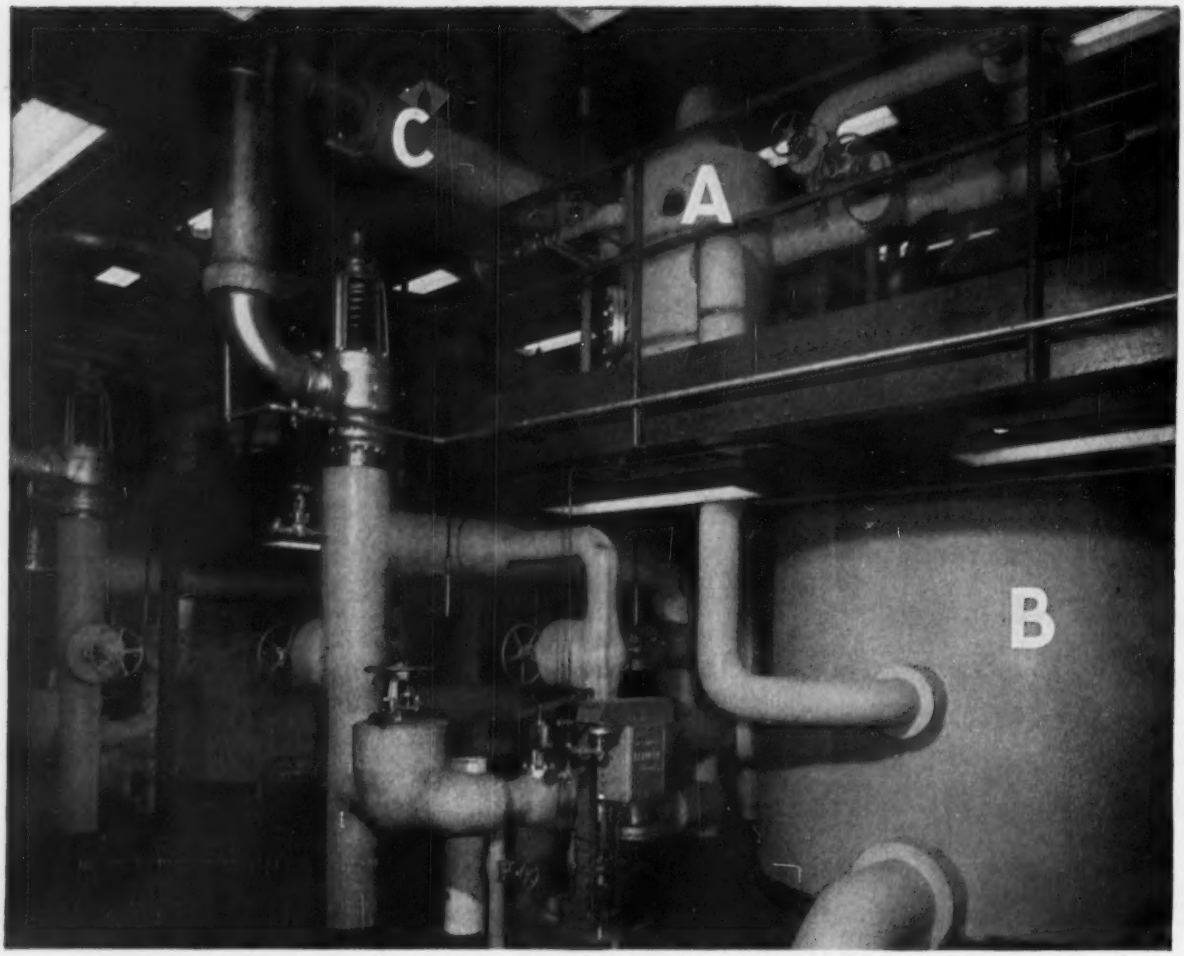
Branch Offices: Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.; Atlanta, Ga.

Manufacturing Chemists for Over 100 Years

Pfizer

Whenever you have a food processing problem, talk it over with your Pfizer sales representative. He'll be glad to assist you.



Piping and equipment in the Sunbury Steam Electric Station of the Pennsylvania Power & Light Company, insulated with "Featherweight" 85% Magnesia Insulation. The flash tank, "A", and the deaerator, "B", which operate between 250 and 275°F. are insulated with 2 inches of 85% Magnesia and ½ inch of asbestos cement. The piping, indicated at "C", is insulated for the protection of personnel.

K&M "FEATHERWEIGHT" 85% MAGNESIA INSULATION KEEPS OPERATING COSTS DOWN

Plants of almost every type throughout the country have benefited from the use of K&M "Featherweight" 85% Magnesia Insulation. By reducing heat losses, operating efficiency is improved and costs are kept down. Made of 85% basic carbonate of magnesia and asbestos fiber, "Featherweight" effectively insulates piping and equipment with temperatures up to 600°F.

Used with a primary layer of K&M Hy-Temp Insulation (Diatomaceous Silica), the combination is effective up to 1900°F. The application of these two layers—with staggered joints—eliminates the heat loss that normally occurs when expansion causes the joints to open in single layer installations.

Also available is "Featherweight" Water-Resistant Magnesia Insulation for temperatures up to 450°F. It is used underground where severe water exposure may damage the insulation or on indoor steam heated lines and equipment where high humidity and moisture are present.

If your company has an insulating problem, contact your K&M distributor who is an experienced applicator. Or write directly to us.

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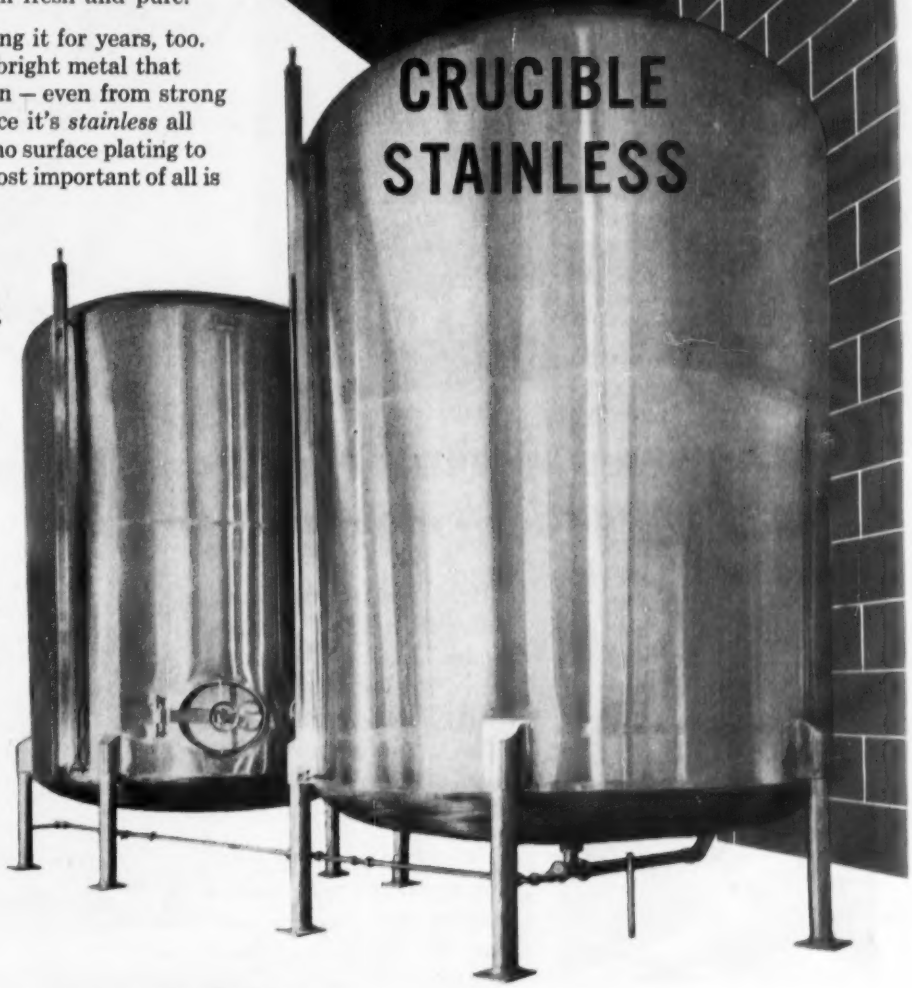
drinks that "hit the spot" *are flavor-protected with* CRUCIBLE STAINLESS

These gleaming stainless steel tanks, made by the Metal-Glass Products Company, Belding, Michigan, protect the delicate flavors of cola drinks. And they help keep them fresh and pure.

They'll keep right on doing it for years, too. For stainless is a tough, bright metal that resists wear and corrosion – even from strong cleaning agents. And since it's *stainless* all the way through, there's no surface plating to chip or wear away. But most important of all is the fact that stainless is inert . . . *it never adds unwanted flavor to beverages – even dairy products.* And, of course, stainless is a snap to keep spotlessly clean.

That's why it's *standard equipment* for tanks, pasteurizers, bottlers, piping, fittings–*everywhere* that food and metal come in contact. It's the most *practical* choice you can make. So next time you're buying equipment make sure it's of Crucible stainless steel. *Crucible Steel Company of America, Henry W. Oliver Building, Pitsburgh 30, Pa.*



CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

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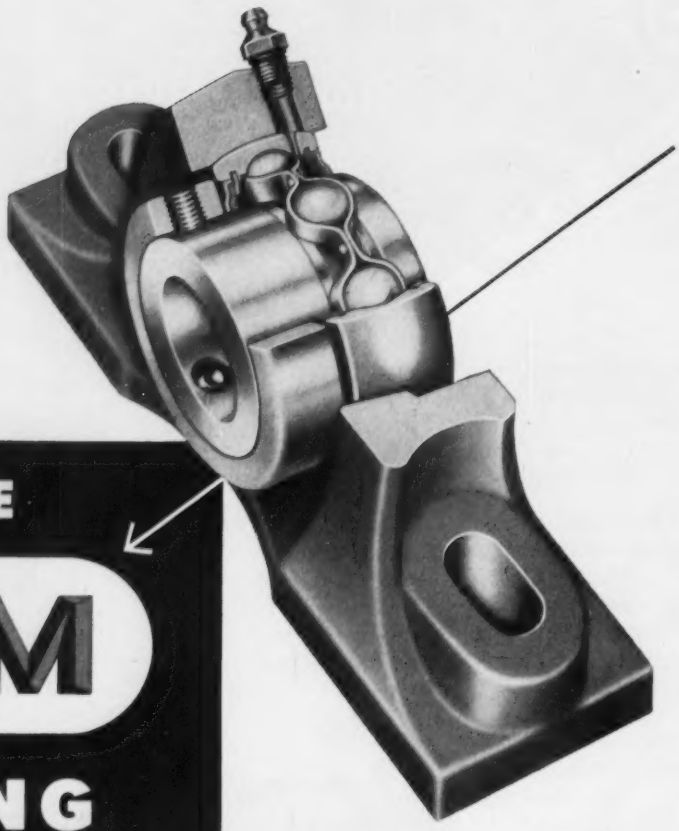

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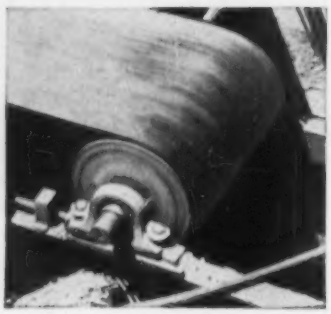
SCM

BEARING

A wonderful new Ball Bearing Pillow Block by Dodge . . . for *medium* duty!



More load-carrying capacity . . . larger shaft sizes . . . plus all the features and dependability of the famous S C Ball Bearing line! These are the qualities provided in Dodge S C M, a new line of mounted ball bearings, available in both pillow blocks and flange cartridge type.

Designed for medium duty, these new bearings are of heavier construction, with complete new housings. Metallic-backed Neoprene seals keep lubricant in, dust and dirt out of the bearing. Engineered to stay put, *the seal won't blow!*

S C M bearings are new members of the famous Dodge 30,000 hour line, all of which are sealed, both on and off the shaft. Fully assembled and pre-lubricated at the factory, they are ready to slip on the shaft. Available from Distributors' stocks in shaft sizes from 1-7/16" to 3-7/16".

Write for bulletin with complete specifications.

DODGE MANUFACTURING CORPORATION
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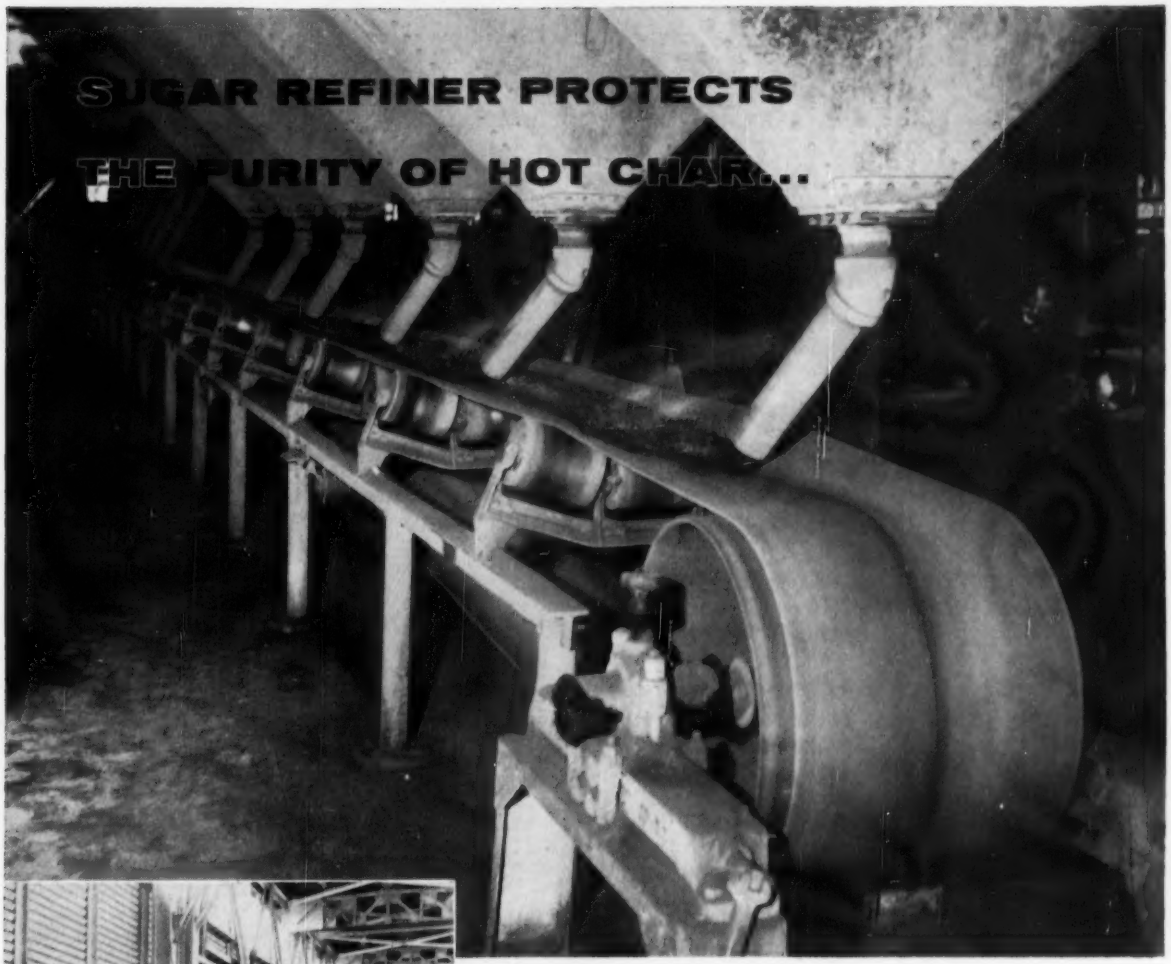
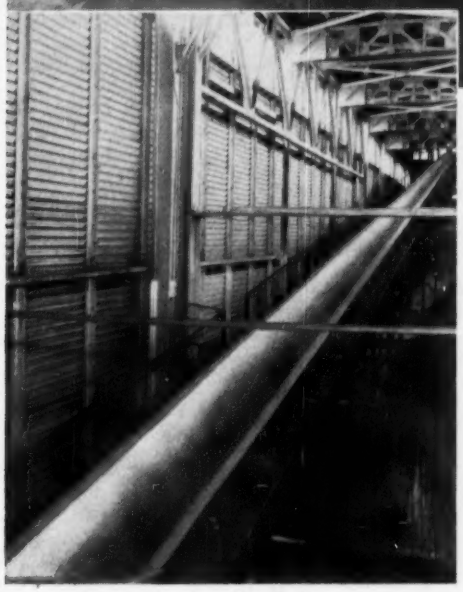
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.





with U.S. Rubber Belts

Above is shown one of the 32 U.S. Belts on which hot char is dumped 24 hours a day 5 days a week in a Louisiana sugar refinery. The big point is that these belts not only withstand the heat, but also do not contaminate the char and impair its purifying action. The belts have been on the job for over 5 years and show no signs of deterioration.

Photo at left shows a U.S. Giant Belt in the same refinery, which carries over 300 tons of raw sugar an hour from travelling hoppers to storage bins. Installed over 6 years ago, the belt *shows no abrasion* from the raw sugar.

These 2 belts exemplify the quality and long life built into every belt in the "U.S." line. There are "U.S." conveyor belts for every kind of food processing and package handling. Get in touch with any of the 27 "U.S." District Sales Offices or write address below.

"U.S." Research perfects it . . . "U.S." Production builds it . . . U.S. Industry depends on it.

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

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MONOCALCIUM PHOSPHATES FOR LEAVENING
SODIUM ACID PYROPHOSPHATES FOR LEAVENING
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DISODIUM PHOSPHATE FOR BUFFERING
PHOSPHORIC ACID FOR ACIDULATION
IT PAYS TO SEE VICTOR

PHOSPHATES FOR LUNCH?

Well, hardly! But phosphates *do* play an important part in the production and processing of many of the foods you enjoy. The bread that undergirds the meal is made more nutritious with calcium phosphate. The salt that seasons is made free-flowing with tricalcium phosphate. Instant puddings are smoother because disodium phosphate aids emulsification.

There are more, many more uses for the amazing phosphate family in the processing of foods. Sugar, soft drinks, cake mixes, flour, yeast, puddings, cheese, evaporated milk, cereals, and candy are some of the food products that have benefited from the application of a Victor phosphate.

For more than 57 years Victor has been a leader in the production of food-grade phosphates. You may be certain that Victor will know if a phosphate can give your product or process an "assist." Your inquiry will be welcomed and promptly answered.

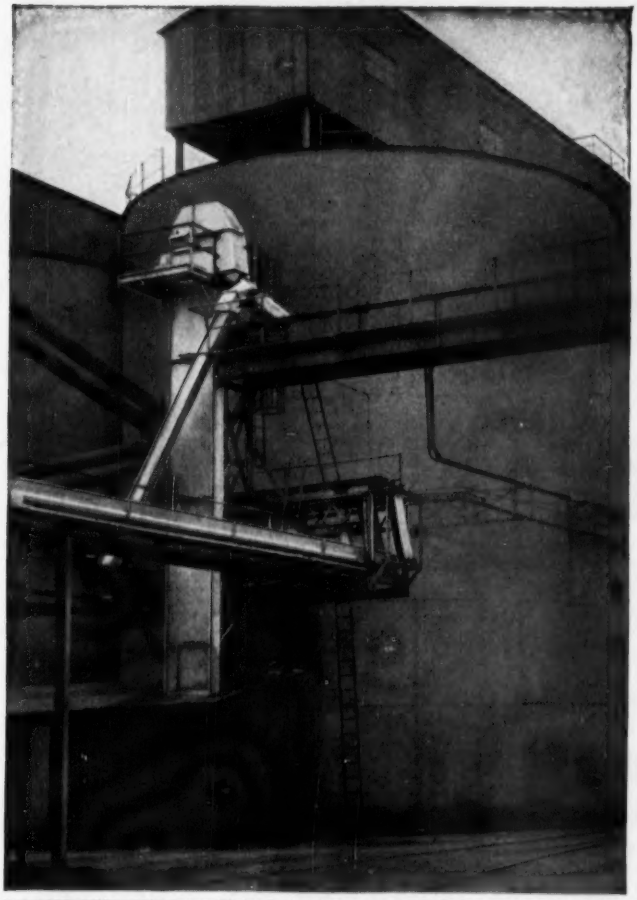
VICTOR SERVES THE FOOD INDUSTRY

Ammonium phosphates—manufacture of yeast, vinegar, yeast foods, pH control of soda crackers, bread improver . . . calcium phosphates—mineral enrichment, leavening agents for self-rising flour, self-rising corn meal, pancake flour and prepared mixes; baking powder. To prevent caking of salt, soda and sugar . . . iron phosphates—iron enrichment . . . phosphoric acid—manufacture of yeast, sugar, soft drinks, imitation jellies, gelatin . . . sodium acid pyrophosphate—baking acid in prepared mixes, doughnut flours, ingredient in baking powders.

VICTOR CHEMICAL WORKS

155 NORTH WACKER DRIVE CHICAGO 6, ILLINOIS

How to lower the cost of elevating



Let LINK-BELT recommend the bucket elevator that meets your requirements from 13 types in 4 basic designs

WANT to cut your cost of raising materials to processing machinery or to storage bins or silos? Regardless of the capacity required — or the characteristics of your material — there's a Link-Belt Bucket Elevator for the job.

Working with this broad line, Link-Belt engineers can select the one best-suited to your needs. A wide range of sizes on chains or belts is available.

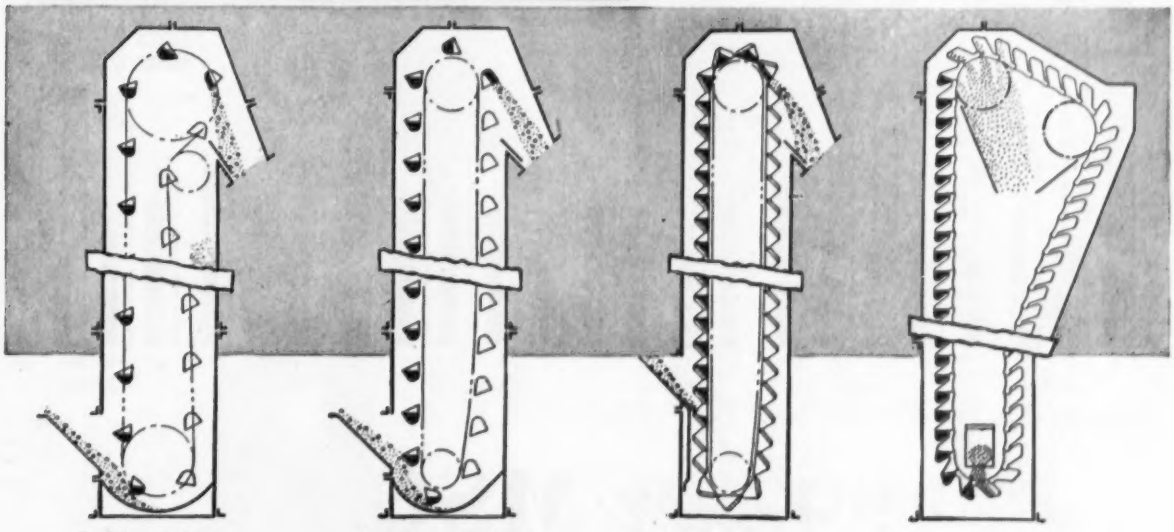
What's more, installation, maintenance and operating costs are low with Link-Belt Bucket Elevators. Rigid, jig-built casings are self-supporting, need only occasional lateral tie-ins depending on height. You have quick access to both head and boot for periodic inspections. Simple screw or gravity take-ups maintain chain or belt tension at all times.

There's an experienced materials handling engineer in the Link-Belt office near you. Call him for complete information.

LINK-BELT

BUCKET ELEVATORS

◀ Midwest soybean oil mill uses several combinations of Link-Belt Bucket Elevators and Screw Conveyors to insure smooth flow of beans throughout process.



Positive discharge
for light, fluffy, fragile or materials that tend to stick to the buckets.

Centrifugal discharge
for free-flowing, fine or loose materials with small to medium lumps.

Continuous discharge
for range of materials —light to heavy, small to large, abrasive lumps.

Internal discharge
for gentle handling of small articles such as pellets, seeds, castings.

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities. 13-250

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URGENT: To all frozen food processors

FX-1201

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WESTERN UNION

W. P. MARSHALL, PRESIDENT

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NL=Night Letter
LT=Int'l Letter Telegram
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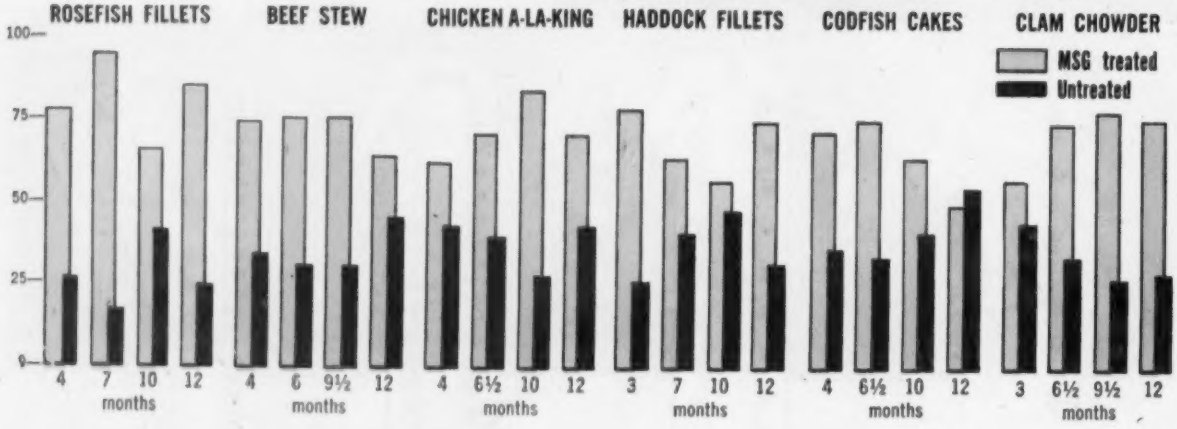
FLASHING YOU RESULTS OF 12-MONTH FLAVOR TEST OF MSG-TREATED FROZEN FOODS VS UNTREATED FOODS AT A LEADING UNIVERSITY* STOP 23 OF 24 TASTE TESTS SHOW MAJORITY OF TEST PANEL PREFERRED FLAVOR OF MSG-TREATED SAMPLES TO UNTREATED SAMPLES STOP. NOTE MORE THAN 2 TO 1 PREFERENCE IN 13 OF THESE TEST PERIODS STOP TEST ALSO REVEALED MOST EFFECTIVE USE-LEVELS FOR MSG STOP PROMISES NEW OUTLOOK FOR STORAGE AND WAREHOUSING PROBLEMS, HOLD-OR-SELL, AND PRODUCTION PEAKS AND VALLEYS STOP YOUR COPY FULL REPORT WAITING AT HURON TECHNICAL SERVICE, 9 PARK PLACE, NEW YORK 7, N. Y. STOP WRITE, WIRE OR PHONE TODAY STOP=

Graphs show percent of test panel preference during 12 months' storage. Flavor tests conducted by university technicians. *Name on request



8.4.10

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PURE MONOSODIUM GLUTAMATE 99+%

Made by the American pioneers in protein derivatives

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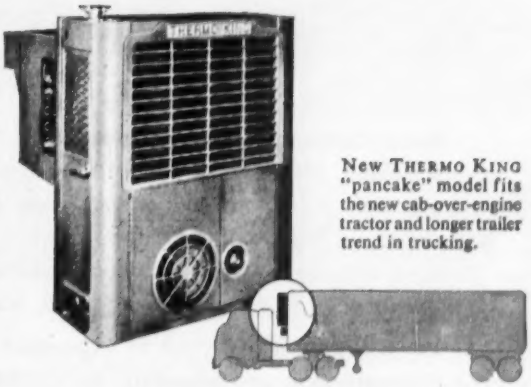
pound for pound

Thermo King

delivers more refrigeration

THERMO KING offers you greater cooling capacity per pound of unit weight than any other truck refrigeration equipment. Less unit weight means more payload. Look first at the leader—THERMO KING!



New THERMO KING "pancake" model fits the new cab-over-engine tractor and longer trailer trend in trucking.

Authorized service and genuine parts—from coast to coast

U. S. THERMO CONTROL CO.

44 South 12th Street • Minneapolis 3, Minn.

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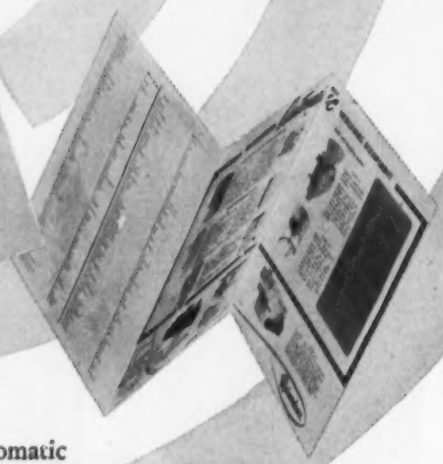
IF WEIGHING, BLENDING
OR PROPORTIONING MATERIALS
IS IMPORTANT TO YOU . . .

THIS NEW GUIDE IS MUST READING



Richardson's new guide to automatic weighing, blending or proportioning of materials points out *new methods-new equipment applications* in these important processes. Simply find your material in the index, refer to the equipment section and you're on your way to improving your present operations through increased speed, economy and accuracy.

Let Richardson's 50 years of experience in building Automatic Weighing, Proportioning and Blending, equipment help you discover new and improved methods in your field—no matter what you handle.

Write today for your free copy of this guide Bulletin No. 0450.

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MATERIALS HANDLING BY WEIGHT SINCE 1902

7489

TRI-CLOVER

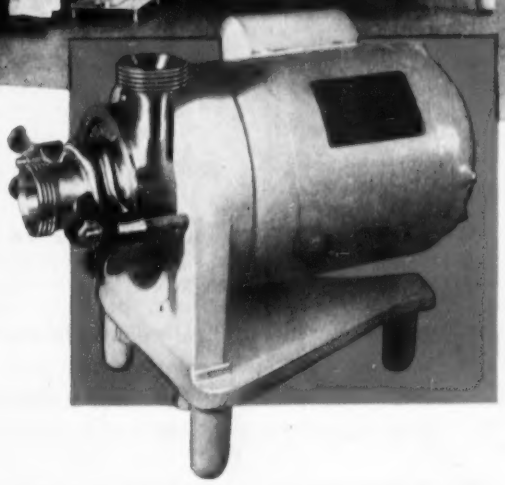
TRI-CLOVER *Nofome* PUMPS

proved in service by leading dairy and food plants

● Shown above, at one of the nation's leading dairy plants, are three Tri-Clover *"Nofome"* Sanitary Centrifugal Pumps selected as original equipment for these three Mojonnier Bros. Cold Wall Tanks—one of many typical efficient, sanitary installations using Tri-Clover *"Nofome"* Pumps now serving leading dairy and food plants.

If your own operations call for a sanitary pump particularly suited to meet exacting, *high head* requirements, take a look at the improved *"Nofome."* This well-known pump line, formerly a product of Specialty Brass Company, now includes Tri-Clover Division's latest design developments and is now more efficient than ever for scores of applications throughout the dairy and food industries.

A few "Nofome" design features tell the reason why these modern pumps are increasingly popular: *3 bladed impeller gives maximum efficiency without foaming or churning . . . heads are smooth, pocket-free and easily removed for thorough cleaning . . . rotary seals are located outside the product zone . . . roller bearings assure long life and quiet, trouble-free operation.*



TRI-CLOVER "NOFOME" PUMPS are available in two types: Pedestal Mount (shown in the top view) and "Pump King" (directly above) — in a wide range of capacities for handling 1,000 to 280,000 pounds per hour (water or liquids of similar viscosity). Heads up to 260-ft. available. Supplied with patented inert carbon seals or water-cooled rotary seals for a wide range of liquids and solids in solution.

For further details on the full line of Tri-Clover Centrifugal Pumps, write for Catalog No. 253.

See your nearest TRI-CLOVER DISTRIBUTOR
EXPORT DEPT., 8 So. Michigan Ave., Chicago 3, U.S.A. Cable: TRICLO, CHICAGO

LADISH CO.
Tri-Clover Division
KENOSHA WISCONSIN

P155

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True Fruits

IN EVERY SEASON

ALVA natural fruit flavors have a reputation for better taste and better utility for these reasons:

1. Most of our true fruit extractions are processed through essence recovery distillation equipment built to our own specifications. This special processing assures the retention of even more of the light fugitive esters so difficult to hold in normal extraction procedures.

2. Storage facilities are maintained under ideal control conditions, improving the life of flavors and guaranteeing freshness in each delivery.

3. Through the years ALVA has developed procedures for handling fresh fruit which assure 100% purity.

ALVA true fruit flavors are ideal for every use, and the ALVA laboratories are eager to help with recommendations and samples for every true fruit problem.

VAN AMERINGEN-HAEBLER, INC.

521 WEST 57th STREET, NEW YORK 19, N. Y.

Alva FLAVORS

Setting Pay Rates On Workers' Merit

Wages of union craftsmen in food company's engineering department are successfully based on the men's job performance and efficiency, as determined by supervisor. And the union approves system

IVAN C. MILLER
Associate Editor, "Food Engineering"

This was an important day for Joe Jordan, sheet-metal worker in the engineering department of a well-known food processing company. It was the day on which his merit rating was to be reviewed to establish his pay rate for the coming year.

When Joe walked into the shop foreman's office, the union representative, Ben Baker, was already there.

"Sit down, Joe," invited Foreman Frank Fullworth, offering his hand in welcome. Then the foreman came to the point:

"You'll recall that when you started in this department we explained the highlights of our system for setting up wage rates."

Joe nodded. "Yes, you told me about the rating system, and afterwards I talked about it with Ben and some of the others in the department."

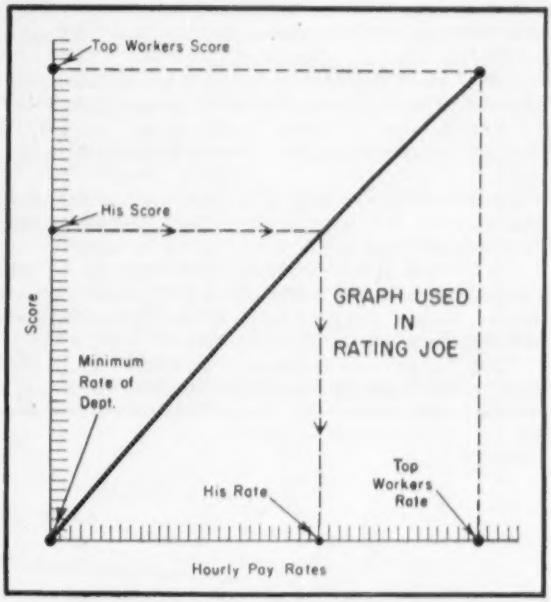
"That's fine, Joe", approved the foreman. "We're glad you showed so much interest. And now let's go over it to be certain all points are clear. Then we'll use the system to determine your next year's pay rate.

"First," continued the foreman, "I want to tell you more of what's behind this merit rating." He then turned to the union representative. "You were here before merit rating, so you know how it was then as compared with how it is now. And you know how the craft employees feel about our system of merit rating."

"Sure do. And I, for one, wouldn't want to see us change back," enthused Ben. "As it is now, a young fellow with a lot on the ball doesn't have to wait on seniority to get his wage rate up to the level with the old-timers.

"You get a break working here," he continued. "You are young, Joe, and just married. And this will be your first time on the system. Anyhow, you can earn high wages here faster than any place I know of. You see, the wage rate for us fellows in the crafts is based on how well we do our job, and not entirely on how many years we have worked here or at the trade. We all figure that it really pays off to do a better job."

"That, Joe", interrupted the foreman, "about explains why our engineering department started this system. We



SIMPLE graph quickly translates Joe Jordan's merit score into his hourly pay rate. Chart is scaled in the ranges between engineering department's minimum rate and the score and rate of top workers.

felt, in fairness to the men and to the company, that each worker should be paid as near as possible in proportion to the value of his output.

"Throughout the year," he continued, "my job as foreman is to learn as much as I can about the work performance of each of you in my department. I am always making notes so that once a year I can fill out one of these merit-rating forms." And he indicated a sheet bearing Joe Jordan's name.

"Of course," he went on, "none of us is perfect on his job. Each of us makes some mistakes and occasionally misjudges. That's why it's company policy to call in each man, along with his union representative, and go over the points step-by-step."

The foreman added that this check by all three of them together was instrumental in bringing about several important benefits, among them:

1. Specific care and impartiality on the part of the department head in observing the worker throughout the year, since the findings must be such as to pass scrutiny by the worker in question and the union man.

2. Fair and accurate relative rating accordingly, of the job performance of each individual.

3. Opportunity, where practical, for each worker to learn in what specific areas he might improve himself in order to raise next year's final score and thus his hourly wage rate.

In addition, an opportunity is provided for either worker or union representative to question the score of any item, or the final relative score.

"Worth the Rate"

In event that accuracy of any score on an item is questioned and not immediately settled, a review at higher union-management level follows (but cases of this kind have been rare).

After this explanation, the foreman reviewed each of the

previously filled out 14 items, or factors, on the form that determined Joe's final M-R score. On certain points Joe asked questions. But neither he nor the steward raised any serious objection to any of the scores.

A final rating was then determined. And later the foreman informed Joe of his new hourly base rate (method of establishing this rate is discussed later).

"Gee," exclaimed Joe, unable to hide his surprise and pleasure, "That is a good raise and I sure do appreciate it."

"Actually what it means," explained the foreman, "is that the volume and quality of your work is worth that rate."

Joe then wanted to know if he would get another merit raise next year if he kept on improving. And he was told he could, and that the company hoped he would.

"And," said Foreman Frank, "just a glance at your rating sheet shows you where it's easiest to make improvements. Mainly, you need to learn how to read drawings and sketches and how to lay out work from them."

Then the foreman explained that courses in making, reading, and using drawings were available periodically, and that the next time such training was offered, Joe would have the opportunity to enroll.

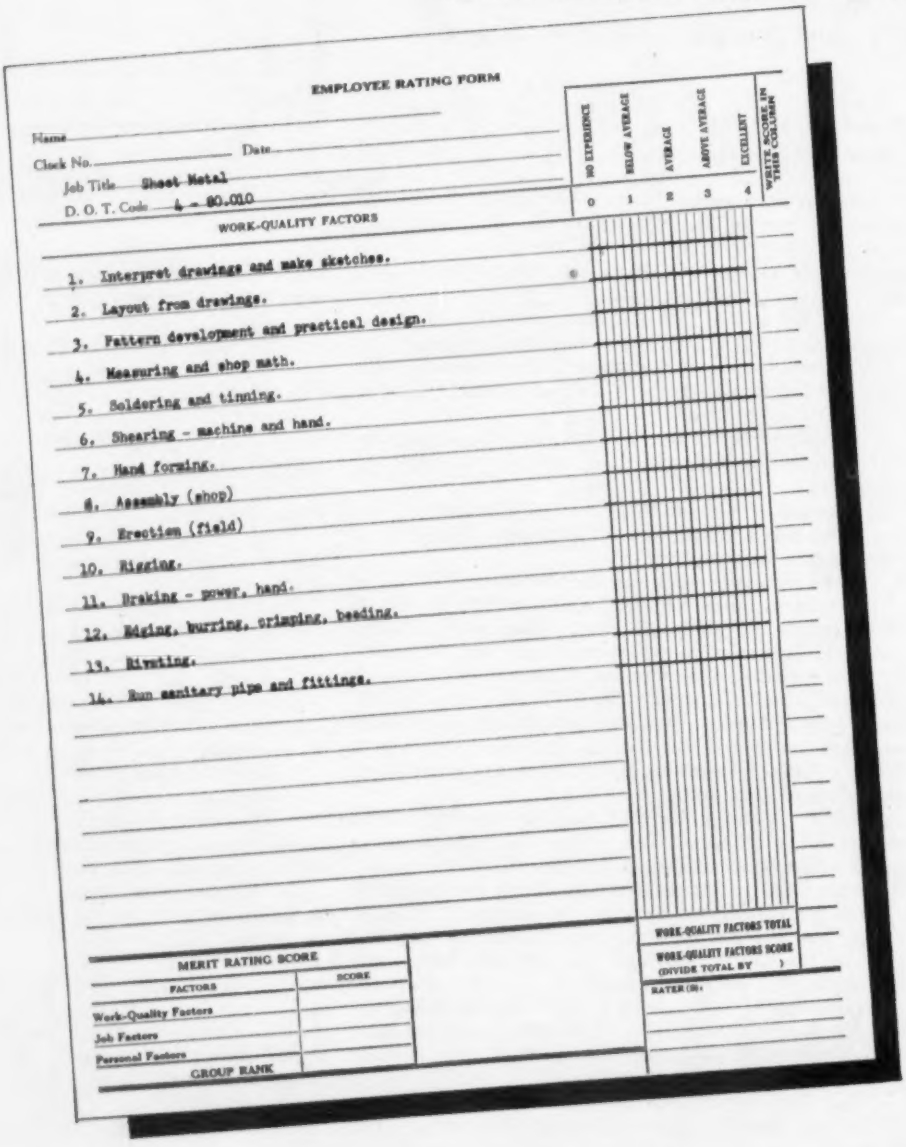
Employee Rating Form

Joe's case has illustrated how M-R works. Now let us take a closer look at the factors involved:

The scoring sheet is divided into three parts, with **Work-Quality Factors** covered first. In this initial category, a sheet-metal man is rated on the following 14 items.

1. **Interpretation of drawings and preparation of sketches**
2. **Layout from drawings**
3. **Pattern development and practical design**
4. **Measuring and shop math**
5. **Soldering and tinning**
6. **Shearing—machine and hand**
7. **Hand forming**
8. **Assembly (shop)**
9. **Erection (field)**
10. **Rigging**
11. **Braking—power and hand.**

MERIT-RATING FORM SHEET



EMPLOYEE RATING FORM

Name _____

Clock No. _____ Date _____

Job Title Sheet Metal

D. O. T. Code 4 - 80.010

WORK-QUALITY FACTORS	NO EXPERIENCE 0	BELOW AVERAGE 1	AVERAGE 2	ABOVE AVERAGE 3	EXCELLENT 4	WRITE SCORE IN THIS COLUMN
1. Interpret drawings and make sketches.						
2. Layout from drawings.						
3. Pattern development and practical design.						
4. Measuring and shop math.						
5. Soldering and tinning.						
6. Shearing - machine and hand.						
7. Hand forming.						
8. Assembly (shop)						
9. Erection (field)						
10. Rigging.						
11. Braking - power, hand.						
12. Edging, burring, crimping, beading.						
13. Riveting.						
14. Run sanitary pipe and fittings.						

WORK-QUALITY FACTORS TOTAL

WORK-QUALITY FACTORS SCORE (DIVIDE TOTAL BY)

RATER (Ini-

MERIT RATING SCORE	
FACTORS	SCORE
Work-Quality Factors	
Job Factors	
Personal Factors	
GROUP RANK	

(FRONT)
WORK
QUALITY
FACTORS

12. Edging, burning, crimping and also beading
13. Riveting
14. Running of sanitary pipe and fittings

A man's final merit rating is based on these 14 items. Then, in the second and third sections of the score sheet supplementary factors are covered. These latter do not play a part in determining merit rating. However, they concern important additional points that are subject to review in the presence of the worker and the union representative.

Thus, the second section covers **Job Factors,** including–

1. Housekeeping–maintenance of working area in a neat and clean condition
2. Quantity of output–volume of work production
3. Safety–use of safety devices, guards for one's own protection and that of others
4. Learning rate–ability to learn duties or jobs; speed and materials and prevention of breakage or loss

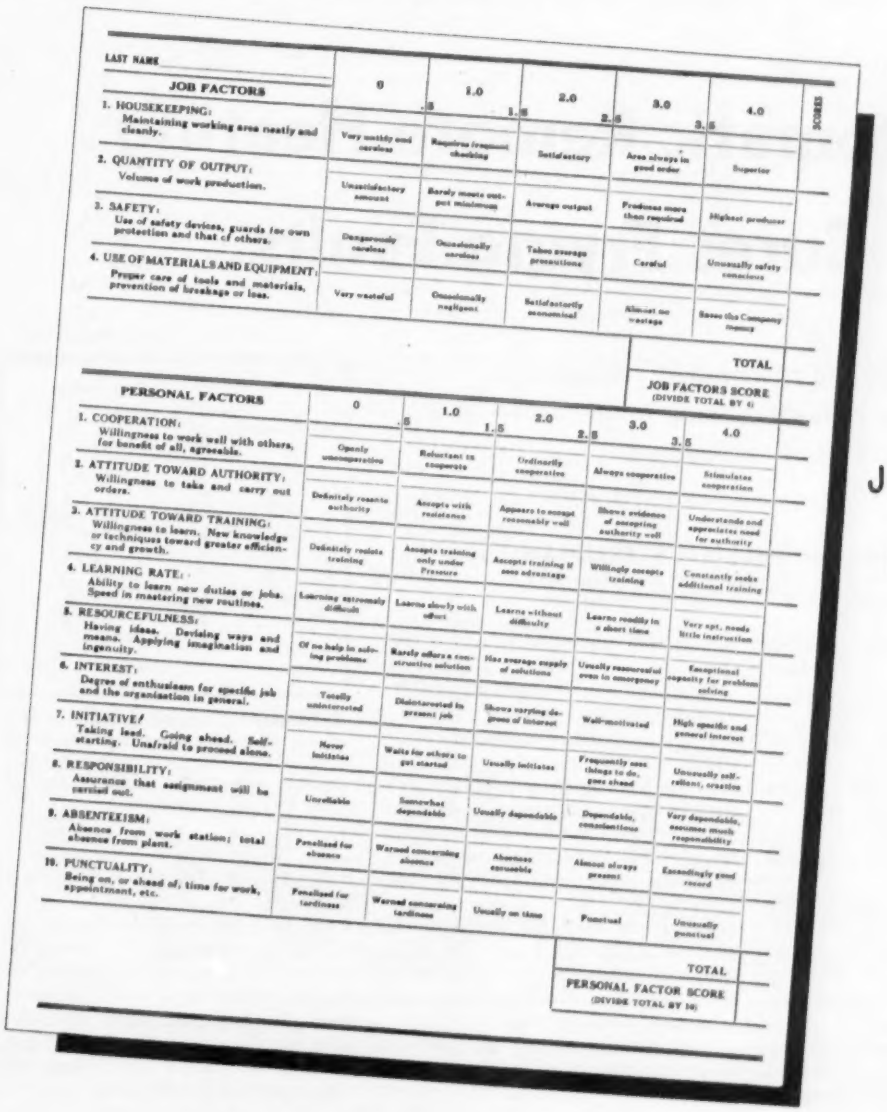
Whereas Work-Quality Factors are specific for each type of work in the engineering department, Job Factors are the same for all departments.

Finally, the third part concerns the Personal Factors. Here, there are included–

1. Cooperation–willingness to work well with others for the benefit of all; agreeableness
2. Attitude toward authority–willingness to take orders and to carry them out
3. Attitude toward training–willingness to learn new knowledge or techniques making for greater efficiency and growth
4. Learning rate–ability to learn duties or jobs; speed in mastering new routines
5. Resourcefulness–having ideas, devising ways and means, applying imagination and ingenuity
6. Interest–degree of enthusiasm for the specific job and for the work of the organization in general
7. Initiative–taking the lead, going ahead, self-starting ability to proceed alone
8. Responsibility–providing assurance that assignments will be carried out
9. Absenteeism–extent of absence from work station and total absence from plant

(*Turn to p. 205*)

SHOWS SYSTEM FOR SCORING



LAST NAME

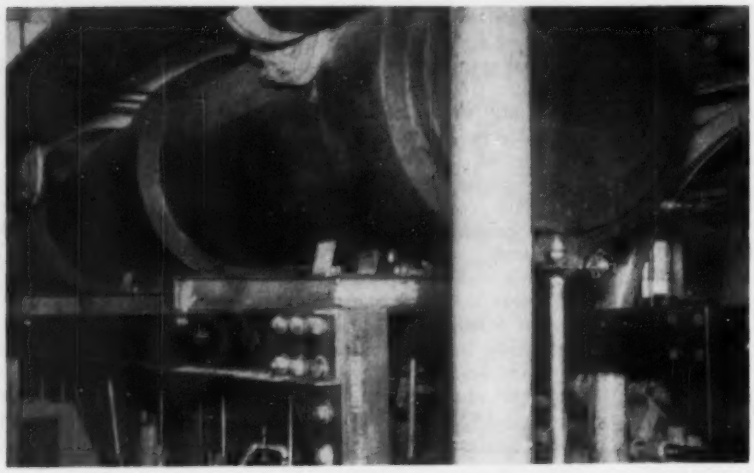
JOB FACTORS	0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	SCORES
1. HOUSEKEEPING: Maintaining working area neatly and cleanly.	Very untidy and careless		Requires frequent checking		Satisfactory		Area always in good order		Superior	
2. QUANTITY OF OUTPUT: Volume of work production.	Unsatisfactory amount		Barely meets output minimum		Average output		Produces more than required		Highest producer	
3. SAFETY: Use of safety devices, guards for own protection and that of others.	Dangerously careless		Occasionally careless		Takes average precautions		Careful		Unusually safety conscious	
4. USE OF MATERIALS AND EQUIPMENT: Proper care of tools and materials, prevention of breakage or loss.	Very wasteful		Occasionally negligent		Satisfactorily economical		Almost no wastage		Saves the Company money	
									TOTAL	
									JOB FACTORS SCORE (DIVIDE TOTAL BY 4)	

PERSONAL FACTORS	0	.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	SCORES
1. COOPERATION: Willingness to work well with others, for benefit of all, agreeable.	Openly uncooperative		Reluctant to cooperate		Ordinarily cooperative		Always cooperative		Stimulates cooperation	
2. ATTITUDE TOWARD AUTHORITY: Willingness to take and carry out orders.	Definitely resents authority		Accepts with resistance		Appears to accept reasonably well		Shows evidence of accepting authority well		Understands and appreciates need for authority	
3. ATTITUDE TOWARD TRAINING: Willingness to learn. New knowledge or techniques toward greater efficiency and growth.	Definitely resists training		Accepts training only under Pressure		Accepts training if seen advantage		Willingly accepts training		Constantly seeks additional training	
4. LEARNING RATE: Ability to learn new duties or jobs. Speed in mastering new routines.	Learning extremely difficult		Learns slowly with effort		Learns without difficulty		Learns readily in a short time		Very apt, needs little instruction	
5. RESOURCEFULNESS: Having ideas. Devising ways and means. Applying imagination and ingenuity.	Of no help in solving problems		Rarely offers a constructive solution		Has average supply of solutions		Usually resourceful even in emergency		Exceptional capacity for problem solving	
6. INTEREST: Degree of enthusiasm for specific job and the organization in general.	Totally uninterested		Disinterested in present job		Shows varying degrees of interest		Well-motivated		High specific and general interest	
7. INITIATIVE: Taking lead. Going ahead. Self-starting. Unafraid to proceed alone.	Never initiates		Waits for others to get started		Usually initiates		Frequently sees things to do, goes ahead		Unusually self-reliant, creative	
8. RESPONSIBILITY: Assurance that assignment will be carried out.	Unreliable		Somewhat dependable		Usually dependable		Dependable, conscientious		Very dependable, assumes much responsibility	
9. ABSENTEEISM: Absence from work station; total absence from plant.	Penalized for absence		Warned concerning absence		Absences excusable		Almost always present		Exceedingly good record	
10. PUNCTUALITY: Being on, or ahead of, time for work, appointment, etc.	Penalized for tardiness		Warned concerning tardiness		Usually on time		Punctual		Unusually punctual	
									TOTAL	
									PERSONAL FACTOR SCORE (DIVIDE TOTAL BY 10)	

(BACK)
JOB FACTORS
AND
PERSONAL
AFFAIRS

Heat Generated Here **Transferred to Oil in This Unit**

FURNACE fired with gas heats liquid heat-exchange medium as it flows through boiler-like tubes.



HEAT EXCHANGER transfers Btu.'s from hot liquid medium to oil used in deep-fat cooker. Employed is insulated exchanger of shell-and-tube type, with cooking oil circulating through the tubes.

Automatic Remote Heating Cures Frying Faults

Curtails oil damage and fire hazard. Saves fuel and boosts capacity. Holds cooking temperature within 2 deg. regardless of throughput

HORACE L. SMITH, JR., and WILLIAM E. FREEMAN
Consulting Engineer, Richmond, Va., and Vice-President of Engineering, H. W. Lay & Co., Atlanta, Ga., respectively

By means of a radically different deep-frying process, big strides have been taken in quality, capacity, safety, and efficiency in potato chip production. In this process, the cooking oil is heated by a remote furnace and heat-exchanger system, and its temperature in the fryer is closely controlled.

Here is a continuous process involving food engineering principles of wide importance.

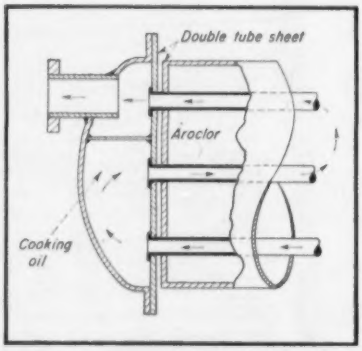
Used since June to fry potato chips in one of the Atlanta plants of H. W. Lay Co., the process has performed so well that it has just been installed in Lay's expanded Jacksonville, Fla., chip factory.

The principle is simple, if ingenious. The engineering which makes it work so well, with so many fundamental food-factory plus values, is a longer story.

Basically, the operation involves "low-temperature" heating of the frying oil by circulating it from the fryer, through a heat exchanger, and back into the fryer again continuously, under instrument control. The low-temperature liquid medium that heats the oil in the heat exchanger is, in turn, circulated through the tubes of a gas-fired furnace.

As can be seen, the high-temperature gas flames that supply the frying heat are doubly removed from the oil itself, and therein lies many of the advantages of the system.

It is because of this arrangement, plus automatic continuous operation, that these benefits result:



SAFEGUARD against contamination of oil or heat-exchange medium in event of a leak is provided by this double tube-sheet construction at ends of heat exchanger.

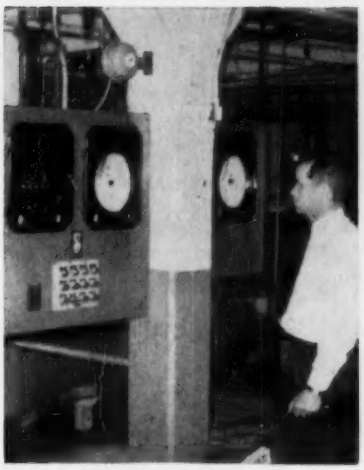
▶ **Fire Hazard Eliminated**—There is no flame near the cooking oil.

▶ **Oil Damage Avoided**—The oil does not come in contact with any surface that at any time is hotter than 450 deg. F.

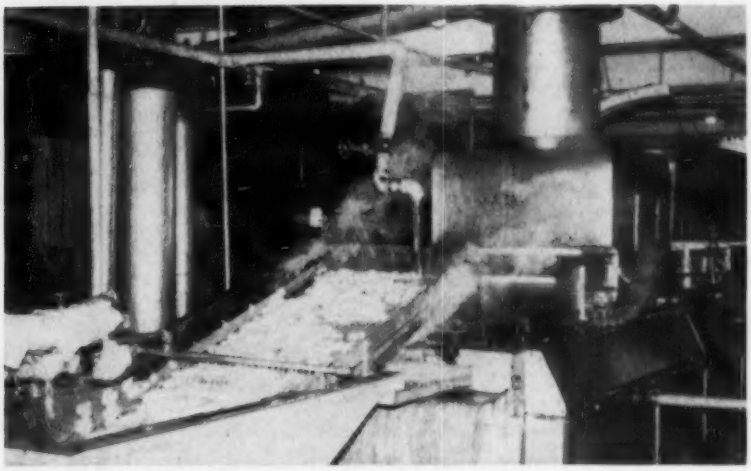
▶ **Quality Improved**—Since the oil is not heat-damaged, the product fried in it is of better quality. And automatic control holds the oil tempera-

Controlled

And Delivered to Fryer To Cook Chips



CONTROLLERS regulate amount of heat generated and transferred to oil as flow of raw chips fluctuates.



CONTINUOUS FRYER moves chips through hot oil, which is circulated through heat exchanger to pick up Btu.'s from liquid medium heated in remote furnace. Potato chip production capacity is increased 50%.

ture within 2 deg. F. for uniform cooking.

▶ **Fuel Saved**–Efficiency in utilization of fuel is 60%, compared with 35-40% for direct-heated fryers. This is particularly significant in view of the large amount of heat required to evaporate the water entering the fryer on, and in, the raw chips.

▶ **Multiple Operation Possible** – One efficient heat source can handle two or more fryers, yet the fryers can be operated at different temperatures.

▶ **Maintenance Reduced**–Not only is the oil heating and control system designed for low maintenance, but the gentle, uniform heating of the oil reduces burning of chip particles and oil discoloration. As a result the fryers need not be shut down and cleaned out so often, and fewer "spotted" chips are produced.

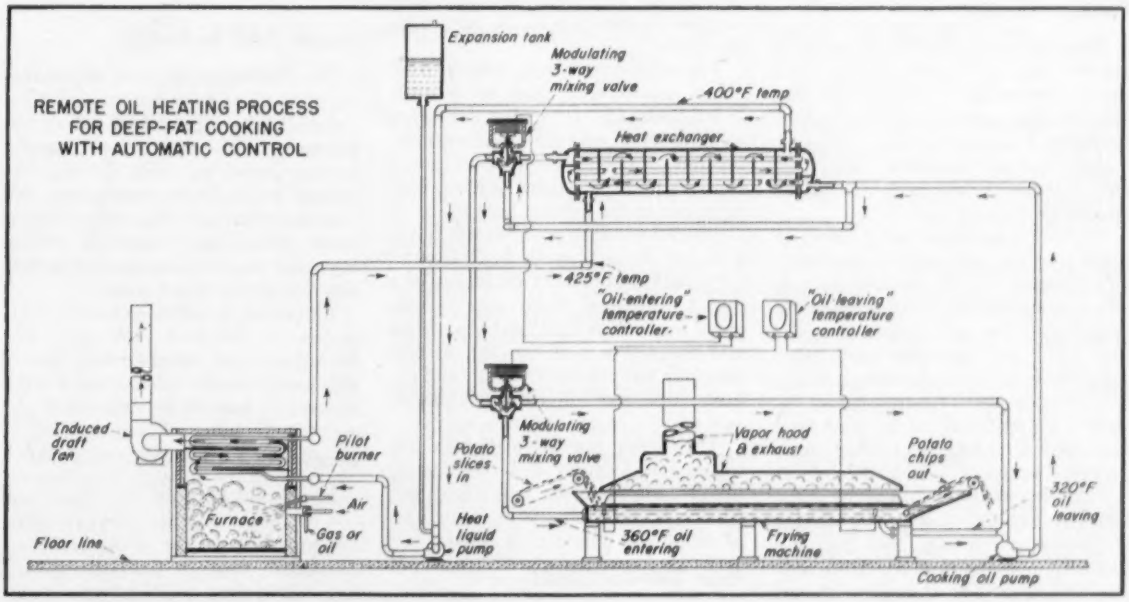
▶ **Capacity Increased**–Because of the controlled high Btu. capacity of the system (2,170,000 Btu. per hr.), output of chips per hour per fryer is increased 50%.

In conventional deep-fat frying, lack of temperature control and damage to the cooking oil are especially serious factors. Let us see why.

Temperature Problem

With a great amount of heat required to vaporize the water in the potato slices, any sudden change in the rate of feeding raw slices to the kettle instantly changes the heat demand in a major way.

If the feed rate of slices is reduced, the temperature of the oil increases



COMPLETE PROCESS schematically shows equipment involved, the circulation of the heat-exchange medium through the furnace and heat exchanger, and the path of the cooking oil through the exchanger and fryer. Automatic control valves and oil-flow bypasses on fryer and exchanger maintain oil temperature within 2 deg. of selected point regardless of big heat-load variations. Two or more fryers can be served by such a system.

rapidly, because of the low specific heat of oil and the fact that only sensible heat is required to increase its temperature. If the infeed rate of slices is increased, then, of course, the heat input into the oil should be immediately increased in like proportion.

With direct firing under the kettle, it is obviously impossible to secure accurate temperature regulation. A tremendous amount of heat is stored in the refractory furnace lining and this heat is given off for a long time even after the fire is reduced or extinguished.

The radiant energy varies as the fourth power of the absolute temperature. Therefore, a furnace hot-face temperature of 2,000 deg. F. and an assumed emissivity coefficient of 0.8 radiates approximately 50,000 Btu. per hour per sq. ft. And a furnace having 75 sq. ft. of hot-face surface would radiate energy at a rate of over 3,000,000 Btu. per hour. So any adjustment in the rate of firing will have little effect on the rate of heat input into the kettle for many minutes.

An important point in producing best quality potato chips is the temperature gradient throughout the length of the kettle. A more or less accepted average will be 360 deg. F. at the inlet end of the kettle and 320 deg. F. at the exit. With a dormant or static pool of oil contained in the kettle, and an open furnace under it, accurate control of the temperature gradient is extremely difficult, if not impossible.

Damage To Oil

Vegetable oils suitable for cooking potato chips are usually damaged by excess temperature. The changes that occur in fats or shortening during deep fat frying include hydrolysis, polymerization, and discoloration. Also, foreign material accumulates in the oil, and flavor changes occur.

Hydrolysis involves the splitting of a fat into its component fatty acids and glycerol. Fresh shortenings usually contain less than 0.10% free fatty acid, but if the fat is mistreated, the free fatty acid content may reach 5%, which is very undesirable. As the smoke point of a shortening is inversely proportional to its free fatty acid content, a high acid value causes excessive smoking.

Fats are easily damaged by overheating. Yet a dormant pool of oil is contained in a shallow tank having a thin steel bottom. And the flame temperature immediately under the tank is 2,500 to 3,500 deg. F. So the temperature of the film of oil at the bottom of the tank necessarily reaches very high values.

The cooking oil acts as a carrier of heat from the bottom of the kettle to the individual slices of potato. Heat transfer is by conduction and convection. But cooking oil is a very poor heat conductor. And to transfer heat several inches by conduction requires a big difference in temperature or thermal gradient.

Heat transfer by convection is dependent on vertical circulation. Hot particles of oil rise, giving up their heat to a slice, are cooled, and return to the bottom of the kettle. With a 4- to 6-in. depth of oil from the bottom of the kettle to the center of the mass of potato slices, natural convection circulation in the oil is extremely sluggish.

With a small area of kettle bottom exposed to the furnace, the rate of heat transfer per square foot of kettle area is necessarily high. And as heat is transferred from the dry furnace gases to the dry surface of the bottom of the kettle, the heat transfer coefficient on the furnace side is quite low. This results in very high stack temperatures and very low overall efficiency. Many chip cookers are operating with stack temperature of over 1,500 deg. and an overall fuel efficiency of not more than 35%.

How Problems Were Licked

The process employed by Lay was designed to overcome these problems and to satisfy the requirements for an ideal potato chip process. Called the Smitherm process, it was designed by Horace L. Smith, Jr., with the cooperation of Lay engineers, has been fully covered by pending U. S. patent applications.

The process starts with a boiler built along conventional lines by International Boiler Co. It involves the water-tube principle, and has sufficient combustion volume for efficient utilization of fuel and relatively low hot-face temperatures of the furnace lining.

Instead of using water in the tubes, a liquid having good heat transfer properties is circulated by means of a pump. Sufficient tube area is provided for both radiant heat absorption and convection heat transfer, so that the stack temperatures are low and the overall thermal efficiency is equal to best current boiler design.

The boiler can be placed in any convenient location and the heating liquid pumped to the heat exchanger, which preferably should be located adjacent to the potato chip cooker.

Heat Transfer Liquid

Steam could be used to heat the oil, but to provide steam at 425 deg., it is necessary to operate a boiler at more than 300 psi. gage. This high pressure introduces something of a physical hazard. In some instances it requires the presence of a licensed steam engineer to operate the boiler.

Many industrial processes requiring high temperature utilize the vapor of a high-boiling liquid. But it is practically impossible to operate such a system at exactly atmospheric pressure. And at positive pressures, the low-viscosity vapors are quite difficult to confine. Therefore, leakage can readily occur, and the vapors are very pungent, disagreeable, and toxic.

If a high-boiling liquid heat exchange medium is used under negative pressure, it is quite difficult to prevent inward leakage of air into the system. And the auxiliary equipment needed to keep the system continuously purged of air is intricate and costly.

The Smitherm process uses a heat-transfer liquid in the boiler and keeps it in the liquid phase. The liquid is a low-viscosity chlorinated biphenyl, nonflammable heat-transfer medium suitable for temperatures up to 550 deg. F. or higher.

This liquid involves no fire, corrosion, or toxicity hazard. It has favorable specific heat characteristics, is readily available at low cost, and has high heat stability. It is used in a simple vented arrangement with an expansion tank, similar to a conventional residence hot-water heating system. The liquid can be controlled at any reasonable temperature. For potato chip cooking, a range of 400 to 425 deg. F. appears to be optimum. Called Aroclor, the heat-exchange fluid was developed by Monsanto Chemical Co.

Unique Heat Exchanger

The heat exchanger is of conventional shell-and-tube design. But it has a double tube sheet. If for any reason leakage should occur, either from the heating liquid or from the oil, the leakage would be to atmosphere. No contamination of the other liquid could occur. This is a simple and inexpensive means of insuring complete isolation of the two liquids.

By providing sufficient heat transfer surface in the heat exchanger, relatively low mean effective temperature differences can be maintained for the amount of heat to be transferred.

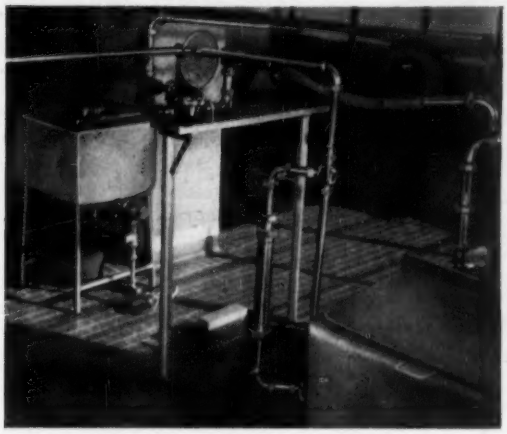
Bypass Heat Control

Heart and soul of the Smitherm process is the method of controlling temperatures in the cooking kettle. Temperature of the heating liquid is easily controlled within a narrow range by conventional equipment that regulates the burner settings.

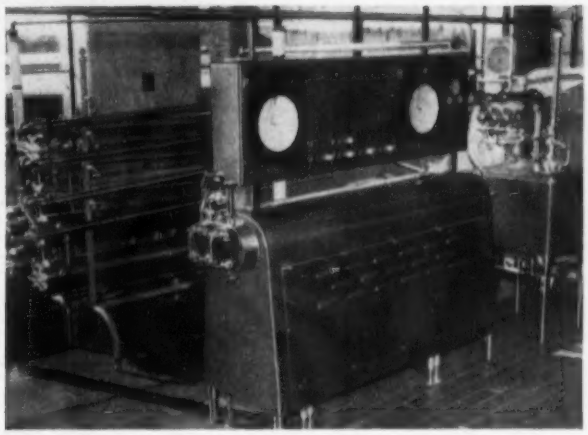
Temperature of the cooking oil en-

(Turn to page 205)

This Space-Saving Setup Streamlines Mixing Operations



MIX BLENDING. Chocolate and granulated sugar are dispersed in hot water in mixer (left), pumped to 2-compartment blending tank (right). Dairy products, liquid sugar, and water are metered to blending tank through units (top).



PASTEURIZING, homogenizing, cooling. Blended mix is pasteurized by Roswell process comprising regenerating preheating-cooling tubes (left), high-temperature unit in foreground. Mix is then filtered, homogenized, cooled to 32-38 deg. in equipment (background).

HIGH-SHORT PASTEURIZATION Ups Capacity, Cuts Labor

Continuous process for ice cream mix, employing 250-deg. temperature, eliminates bulky holding tanks, gives improved bacterial destruction. Entire system is cleaned by recirculation, thus greatly reducing labor

RAY O. TARDIFF
Vice-President, Breyer Ice Cream Co., Philadelphia

Faced with the problem of increasing mix-making capacity without adding to the size of its mixing room, Breyer Ice Cream Co. early last summer switched from batch to continuous processing at its Newark, N. J., plant.

And in addition to getting the desired capacity rise, these extra benefits were attained:

1. Improved bacterial destruction resulting from the higher temperature employment (250 deg. F.) in the short-time pasteurization setup which is an integral part of the new system.

2. Savings in steam and refrigeration through application of regeneration to heating and cooling the mix.

3. An easier, more fool-proof cleaning procedure.

This installation was preceded by seven months of testing at the company's Philadelphia plant, using a 12,000 lb./hr. Roswell pasteurizer. During this time, various time-temperature relationships were determined to best meet the requirements of our product.

With operational problems and details thus resolved, orders were placed for five units for installation in three Breyer ice cream plants.

Operating Procedures Set Up

Since this was the first application of the Roswell process to pasteurization of ice cream mix, considerable work was necessary to evolve operational procedures to effect the desired purposes.

During the seven-month trial, assistance and advice were given by National Dairy Research Laboratories, technicians of Chicago Stainless Equipment Corp., and many health officers and sanitarians.

Finally evolved for the Newark operation was a system of HTST pasteurization in which the mix is heated to 250 deg. F., immediately cooled to 207 deg., and held for 25 sec. in 2-in. holding tubes.

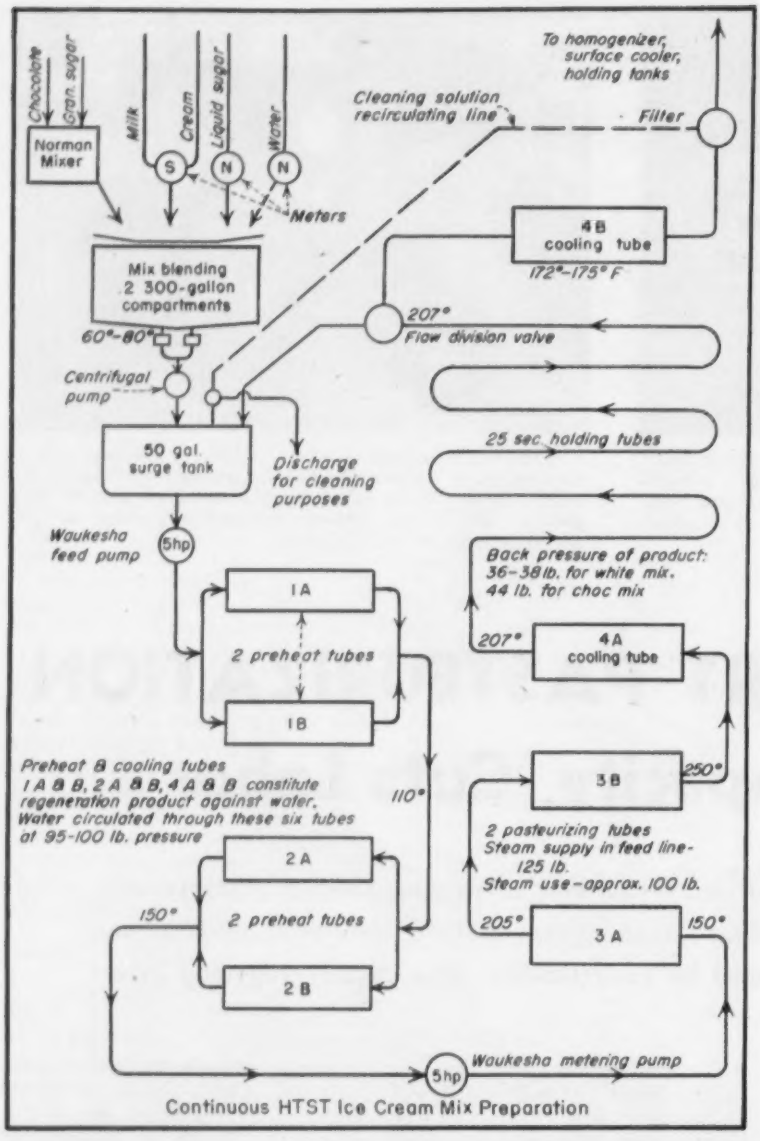
Mix then goes through the flow-diversion valve to a second cooling tube that discharges it within a 172-175 deg. F. range. At this temperature it flows to the filter, homogenizers, and surface cooler, leaving ammonia section of latter at 32-36 deg. F.

Cold Mix Problems

Ice cream manufacturers are accustomed to blending mix ingredients in a jacketed or heated blending tank. In Breyer plants, however, the equipment was so designed as to blend dairy products and other ingredients to form a cold mix.

In the Newark installation (see flow diagram) dairy products are drawn

Blueprint of Non-Stop Operation



Continuous HTST Ice Cream Mix Preparation

from holding tanks, which are maintained at 35-38 deg. F. Sugar may be either granulated or liquid, or both. Chocolate is in granules.

Desiring to blend a cold mix, these problems were encountered: (1) dispersing chocolate and granulated sugar without settling in the bottom of the blending tank, (2) breaking down particle sizes, and (3) keeping pumps and strainers and filters free from solids accumulations.

To overcome these problems a Norman mixer was installed. Although not a part of the Roswell unit, it is incorporated in the mix-making set-up. The mixer is a tank of 75 gal. capacity. Bottom is equipped with a circular agitator directly driven by a 10 hp., 1,750 rpm. motor. Tank has a large opening in the lid, a 2½-in. outlet into which is set a perforated strainer.

Chocolate and hot water are placed in this mixer—where 170 lb. of chocolate are completely dispersed in 350 lb. of hot water in about 3 min. During this time, particle sizes are very effectively broken down, the chocolate is placed in suspension, and the fat is quickly dissolved. Mixture is then pumped to a compartment of the blending tank. Further, granulated sugar is put through the mixer with either hot or cold water.

The blending tank comprises two compartments, each of 300 gal. capacity. It is single walled and unheated. And each compartment is equipped with an agitator. Milk and cream are metered to it through a Siemens flowmeter, a German unit available through representatives in this country. It comes with or without automatic controls. Our experience to date shows this instrument to be accurate within small and practical tolerances.

Water and liquid sugars are measured through Neptune meters equipped with automatic shutoffs.

All mix ingredients are assembled in the mix blending tank, filling each compartment alternately. One compartment is filled while the other is being emptied.

In addition to the above-mentioned mixing and blending tanks, the system comprises a 50-gal. surge tank; the Roswell equipment composed of 4 preheater tubes, 2 pasteurizing tubes, and 2 cooling tubes; 2-in.-dia. holding tubes; filter; homogenizers; and surface cooler. Water-to-product regeneration is applied to the preheating and cooling tubes.

At the beginning of each day's operation, city water is added at the blending tank and circulated through the system. This enables checking for leaks, after which steam is turned on and the control set for desired temperature. When the water is heated to the required temperature, the flow-diversion valve opens to enable forward flow through remainder of the system. Water is then discharged at outlet of surface cooler.

By this time all equipment has passed the leak test, so the compartment of the blending tank containing water is allowed to empty and the other compartment (filled with cold mix) is opened to permit the mix to follow through. In this manner the equipment has been heat conditioned, and mix follows in forward flow.

This method of starting the day's operation assures elimination of air from the system and permits proper temperature settings to obviate the possibility of cook-on.

Cold mix is pumped through a ½ hp. G & H centrifugal pump to the 50-gal. surge tank. Level in this tank is held constant by a float valve. From here the mix is pumped by a 5 hp. Waukesha pump through preheating tubes 1A and 1B (refer to diagram), then through tubes 2A and 2B. Both pairs of tubes are operated in parallel. Mix emerges at approximately 150 deg.—an increase of approximately 80 deg. obtained by regeneration.

From the preheaters the mix is metered through a 5 hp. Waukesha pump to two pasteurizing tubes (3A and 3B) installed in series. Heating medium here is saturated steam, which enters the chambers through a regulating valve and impinges a baffle to give uniform diffusion throughout.

Hot condensate is simultaneously sprayed into the chamber to desuperheat the steam. Condensate system separates and removes noncondensables from steam supply and return unused condensate to boiler feed line.

Controls include a Foxboro Stabilog temperature controller. This instrument is manually adjusted to regulate amount of steam required by the particular mix to be processed. It is calibrated to maintain sensitivity with a steam demand at the pasteurizing tubes of up to 100 psi. with pressure in the 2-in. feed line of 120-125 lb. This sensitivity will maintain a normal temperature variation within ½ deg. F.

First pasteurizing tube increases temperature to approximately 205 deg., and the second tube elevates it to 250 deg. Mix then passes through first cooling tube (4A) where its temperature is lowered to approximately 207 deg. It is held at this temperature for 25 sec. in the 2-in. holding tubes, then goes through the flow diversion valve to the second cooling tube (4B). Leaving here at 172-175 deg., the mix flows to the filter, homogenizers, and surface cooler, leaving at 32-36 deg.

Requirements in New Jersey are 180 deg. for a 25 sec. hold. This accounts for placing the second cooling tube beyond the flow diversion valve.

Product to Water Regeneration

Equipment is operated at 1,200 gal. per hr. The six tubes comprising preheating and cooling sections are a closed water system. Prior to the day's operation, city water is admitted and discharge valve is shut after making sure all air has been purged. This water is circulated continuously at 95-100 lb. pressure. Water consumption in this system is negligible.

Path of heating or cooling medium is through the cylinder barrel of manifold, and through the cores or tubes counter to flow of product.

At conclusion of pasteurizing, the last mix from the surge tank is followed with hot water. In turn, this is followed with cold water for about 5 min. to cool off the equipment. Before the latter, however, system is shut down momentarily to enable removal of the flow diversion valve from the line and immerse it in hot oil, thus permitting forward flow through homogenizer and over surface cooler.

Now for the recirculatory cleaning hook-up: This is done by connecting a 2-in. sanitary line from the discharge fitting on the filter to the surge tank (dotted line on flow diagram).

Surge drum is charged with special alkali plus wetting agent and approximately 35 gal. of water. Pumps are started and controller is set at 225 deg. The alkaline solution is recirculated for 20 min., the last 3 min. with control setting reduced to 195 deg. Alkaline solution is then discharged and the system rinsed with hot water for about 12 min.

Surge tank is then charged with 5 pt. of organic acid plus wetting agent and water to maintain 35 gal. in the system. Controller is again set at 225 deg. and the acid solution circulated for 20 min. It is then discharged. A 10-min. hot water rinse follows, then temperature controller is shut down and cold water passed through the system for approximately 5-7 min.

Pasteurizing tubes 3A and 3B are the first ones dismantled. These are placed on a special designed rack and hand brushed where needed. Usually, 3A will be practically clean, but 3B will have a slight amount of fibrous residue loosely deposited along the flights or spirals toward the end of the tube. Cylinders are likewise relatively clean—a few passes with a brush sufficing to complete the cleaning job.

Remaining tubes and all lines in the system are dismantled. Parts are hand-brushed and pipes are cleaned in pipe tank. There is actually very little deposit on remainder of equipment in the circuit. Surge tank, blending tank, homogenizers, surface cooler, and pipe lines are cleaned in the conventional manner.

Equipment Flexible

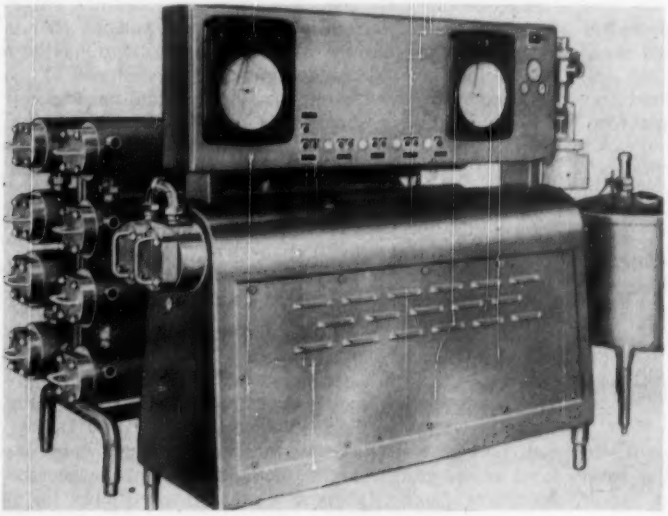
Operation of the equipment will differ in some details of temperature, time, and capacity due to character of mix ingredients, solids content, presence of egg yolk, temperature at which mix is admitted, and number of regeneration tubes employed.

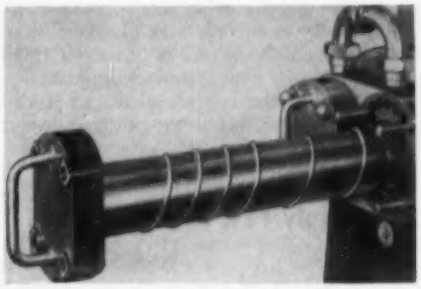
Capacity can be increased by raising temperature of mix entering pasteurizing tube 3A. A heated blending tank, or an additional preheating tube, could accomplish this. Length of sanitary lines will have an effect on the back pressure, causing an operational difference.

The Roswell equipment is flexible, lending itself to various forms of installation. It may be adapted to individual plant conditions and product requirements. It may be used as a pasteurizer with or without regeneration and with other tubular or plate equipment.

In fact other Breyer plants have employed the unit in conjunction with existing preheating equipment.

Above feature is based on the talk "HTST Pasteurization of Ice Cream Mixes With Roswell Heater," presented at Annual Ice Cream Conference, Pennsylvania State University, Jan. 21, 1954.





HEART of new system is Roswell pasteurizer (left). In it mix flows in a thin film between spiral heating tube (shown partly removed in photo above) and manifold, heating mix from both sides. Electrical controls are housed in instrument panel. Flow diversion valve is seen right. Steam and condensate controls are in base. Preheater-cooler is at left, surge drum at right.

KNOW WHAT YOU ARE DOING

Not Just What You're Doing It To

For the benefit of your company's progress and your own advancement, you'd better develop the unit-operation concept. You must know the basic methods of doing things to food materials. Science not enough

L. V. BURTON

Executive Director, Packaging Institute, New York, and former Editor of "Food Industries"

ONE OF THE PROBLEMS we face in food processing is clearly distinguishing between *what we are doing* and *what we are doing it to.*

We food technologists are fully acquainted with what we are doing it to. This "what" is obviously the food material itself.

By what we are doing I refer to what we are doing in the factory. Foods are processed in the factory—not in the laboratory. And I hope that some day there will be more food technologists in the plants than in the laboratory.

Of course this "brings up the old, old problem of what is the difference between food science, food technology, and food engineering. Or stated more broadly, the difference between science, technology, and engineering.

I believe we can all agree that science, or scientific investigation, is primarily the outcome of small-scale laboratory functions.

I hope we can all believe that engineering is primarily a factory-scale function—a function by which we are applying the scientific principles discovered in the laboratory.

In between science and engineering comes technology. I suggest that the food technologist utilizes the facts and principles about foods discovered by the food scientist. And he develops a set of specifications for a food process that is calculated to produce an end product that will be satisfactory to the sales department.

But it's up to the engineer to make the specified process work satisfactorily: (1) As to quality of the processed food; and (2) as to its final manufacturing costs.

What does the engineer have to work with to bring into practical existence the ideas specified by the food technologists?

Amazingly Few Methods Used

Actually he has only a few *methods* by which, with the aid of industrial equipment, he can accomplish the desired objective.

It is astonishing to discover, when you visit various kinds of food plants, that the food engineer has only 10 to 15 basic methods of carrying out his assignments.

The equipment may be quite different in plants where different products are undergoing process, but the basic methods are few. Every food processing plant uses one or more of them regardless of which of the 400-odd food raw materials are being processed.

Here is what the food engineer is doing:

1. **Separating**
2. **Materials Handling**
3. **Heat Exchanging**
4. **Mixing**
5. **Disintegrating**
6. **Forming**
7. **Controlling**
8. **Coating or Surfacing**
9. **Packaging**
10. **Storing**
11. **Possibly we may have to create a new category to include ionizing radiation.**

And these are *all* that any factory has available in the way of methods of physical manipulation.

There are a few more methods in a wholly different category than the foregoing. In these the method achieves a chemical change or a change of composition of the food undergoing process. These methods are not so clearly defined as the physical methods, but here they are, as far as I understand, them: (1) Fermenting. (2) Hydrolyzing. (3) Coagulating.

There may be more of these methods but I am not aware of them.

Here I am concerned only with the physical methods of processing foods, called *unit operations.*

Unit Operation Is Basic Method

Don't let that word *unit* get you down. A unit operation corresponds to the molecule of the chemist, which is the smallest particle of matter we can have and yet maintain its chemical identity. In a comparable manner, a unit operation is a single form of physical manipulation that is incapable of resolution into still simpler manipulations that perform the same function.

Or, we can give it a more highbrow definition and call a unit operation a controllable or intentional change of form or place of a food raw material.

My own preference is for a definition in the vernacular that even a workman can understand:

A unit operation is one of the things we are doing —one of the few methods by which we accomplish the result that has been specified by the food technologist.

The several unit operations and unit processes constitute the *what we are doing* in contrast to the *what we are doing it to.*

What is all this leading up to?

Simply this:

I believe that the time has now arrived when we need closer study of the methods we employ in food processing plants. I believe we need these studies for at

least two reasons: (1) Their effect on quality of the food. (2) Their effect on cost of carrying out the desired operation.

A possible third reason would be their study to produce the same result for a lower capital investment.

Take filtering as an example of the larger classification of separation—the separation of *this* from *that* ("*that*" being a fluid, either liquir or gas). It makes no difference what we are filtering, whether it be water, milk, flavoring extracts, vegetable oils, beer, vinegar, brines, syrups, or what have you. The job we are performing is filtering—the separation of a solid from a liquid.

Also it makes no difference what sort of equipment we are utilizing to effect the separation. We are filtering whether we use a pulp filter, a plate and frame filter, a continuous filter.

From the engineering viewpoint, we want to know whether we are doing a good job of filtering, at a low operating cost. And we also want to know whether we are doing this with equipment that has as low an initial cost as is consistent with the capacity needed and the quality of job required with low maintenance cost and low clean-up cost.

Pays to Think Unit Operations

There is still a further reason for a clear comprehension of the unit-operation concept—the *what we are doing*.

With such comprehension, our minds will be more receptive when we visit another sort of factory than the one in which we work. Invariably, we get ideas when we visit a different type of factory—often good ideas.

That is true even if the plant is concerned with making confectionery and we are bakers, or if the plant makes meat products and we are cereal product manufacturers, and so on.

For it helps to break down the barrier between our thinking and the other fellow's if we think in terms of what he and we are doing, rather than in terms of the different food material undergoing process.

Another benefit of this line of thinking is that the initiative for new equipment should come from the food processing plant to the equipment builder. Usually, however, it is the other way around, and the equipment builder dreams up a good idea and sells it to you as a better way of doing what you have been doing for years in the old way.

Let me give you an example of a man who once told me that he had a very low idea of certain equipment builders. He explained:

"I have been waiting for 12 long years for one of them to come in and sell me something that is better than what I have been using."

That, I submit, is not the way to progress. He should have been telling the equipment builders (dryers, in this case) of his needs for an improved drying operation.

And still another reason exists for a comprehensive study of our unit operations. Continuous processes are here, although not everyone has yet adopted them.

A continuous process is merely a sequence of independently operating unit operations and unit processes, each under automatic control.

Perhaps some equipment builder has already isolated and studied all your unit operations and unit processes, and has persuaded your management to install his complete equipment. If not you will either have to wait until he comes to you, or do the job yourself.

In the latter case, you will have to study the characteristics of each operation and process and determine quantitatively just what you want accomplished—at what rate, temperature, pressure, and the like. Then you must hunt for equipment that will perform as you demand, or have it built to your own design. Otherwise you won't have a continuous operation or process.

Those who have developed an understanding of the difference between a *method* of attaining an end and the *product* undergoing the manipulation will be quicker to pick up ideas and apply them.

Methods Men Get the Money

Also they will be quicker to see the obvious. It's strange how we mortals can become so accustomed to a way of doing a thing that we cannot, or do not, see anything but the product.

I think this is the reason that so many food companies have been known to employ, for the best paying jobs, outsiders who know very little about foods or food technology. These chaps are specialists in Methods—what we are doing.

And they draw down the five-figure salaries, while the chaps who are specialists in the product—the *what we are doing it to*—get the four-figure salaries.

The money we can save our employer by lowering his production costs cannot be found by robbing formulas or using cheaper ingredients. But it can be found in cheaper methods—lower cost unit operations and possibly lower cost unit processes.

If we cheapen the product ingredients, the consumer acceptability of the product may be lowered and the selling costs—the advertising, the salesmanship needed, the demonstrations, etc.—are almost sure to increase. Then although a slight reduction in cost of the finished goods may be attained, the expense of selling the goods may offset the saving—or may even go beyond the saving.

But when economies are effected through lower cost methods—unit operations and unit processes—the quality of the goods remains high, the cost of selling them will not increase, and the cost of producing them can be reduced. This makes for real profits for the employer.

And the food technologists can do it if they have a keen desire to study the methods used and how to improve them.

I once was asked to criticize a small bakery. And I noted that the operations were performed by the following workers: 1 dough-mixer man, 1 oven man, 1 handy man, 22 women who did nothing but insert the baked goods into folding cartons, and 1 packer.

Twenty-three labor hours out of 26 were devoted to packaging—one of the unit operations. Packaging is necessary, but the cost of doing it here was amazingly high. Here was a case where all effort was directed to the product, seemingly little to the method.

It's for Your Own Good

In terms of your own self-interest and self-advancement, you should pay increasing attention to unit operations—*what your company is doing*.

It is one of the few remaining frontiers of cost reduction in food manufacturing .

This article is from an address before the New York Section of the Institute of Food Technologists on Nov. 16, 1954.

A–How Fully Automatic Linking

FROM STUFFER (A) sausage meat is pneumatically forced into 55-ft. strand of casing. Stuffed casing is then check-weighed on table-mounted scale (B).

CASING is next fed to linking machine, which automatically forms sausage into uniform links by a twist-spin principle that doesn't require string.

Advanced Machines *Do It Again*

Solve the "Unsolvable"

With Benefits-Plus on the Line

Teaming latest mechanized frankfurter linking and casing-peeling machines, Midwest packer speeds in-process handling. Also gets more uniform quality products, and saves labor, space, and product

JOHN V. ZIEMBA
Associate Editor, "Food Engineering"

What it wanted in advanced equipment–and even more –was finally found by Oscar Mayer & Co. of Chicago.

Year after year, this packer of quality meats had been searching for a fully automatic machine to strip artificial casings from frankfurters. But all was frustration. It seemed almost "unsolvable."

Then, finally, the answer was sighted–in the new pilot model sausage linker, with companion casing stripper, just completed by Kartridg-Pak Machine Co. of Chicago.

Special feature of the new linking machine is the elimination of the string conventionally used to tie sausages into lengths. The unit achieves the linking by simple pinch, twist, and spin actions.

As for the costly problem of manually peeling casings from frankfurters, this difficulty was not exclusive with Oscar Mayer. It was found in the whole meat field.

"Bugs" had to be first worked out of the new sausage linking and stripping machines. And the Oscar Mayer plant became the proving ground, with the meat packer supplying technological know-how and the equipment firm the mechanical knowledge.

After all rough spots were ironed out, this enterprising packing firm installed its present highly efficient frankfurter line. Let's trace the operations, starting at the sausage stuffers:

First step to assure uniformity of product involves the system of check-weighing. A scale (Exact Weight) mounted on the stuffer table is used to check-weigh each 55-ft. strand of meat-stuffed cellulose casing leaving these machines. And, in turn, the subsequent packaged units–½ lb. and 1 lb. self-service packages–come within closer weight tolerances.

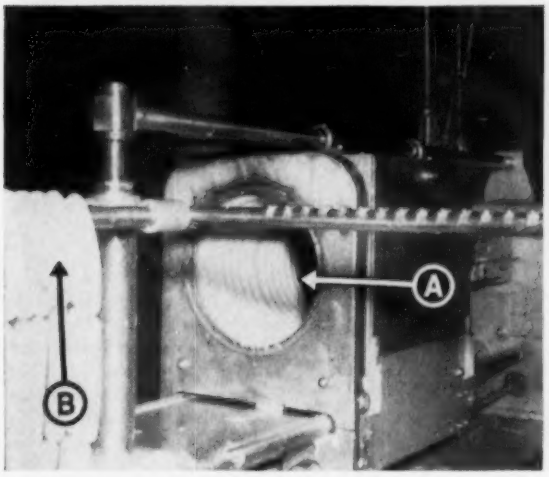
If the strands were not thus check-weighed, a tendency to over- or under-stuffing would result, causing undesirable variations in weight and diameter of the franks, thus lowering uniformity and appearance of the packed product.

Uniformity in the length of frankfurter links is attained by fully automatic linking machines, each handling 1,000-1,400 lb. hourly, depending upon diameter of casing. These drum-type sausage linkers (Kartridg-Pak) were chosen for their economy of installation and operation.

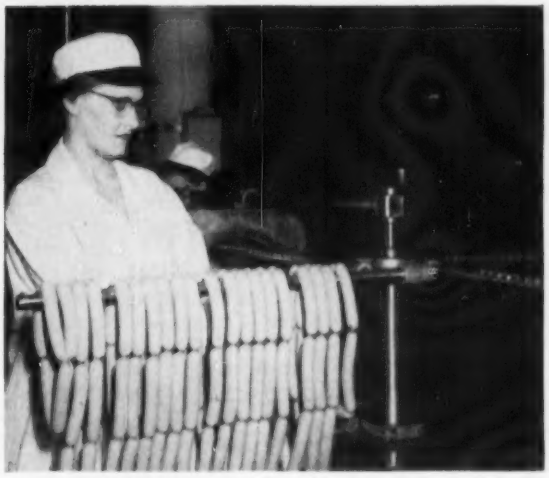
Forming frankfurter links on a twist-and-spin principle, these heavy-duty machines have enabled Oscar Mayer to chalk up six significant benefits:

▶ Production of links more uniform in appearance and in length (5 or 5⅛ in.).

Machine Works (1,400 Lb./Hr.)

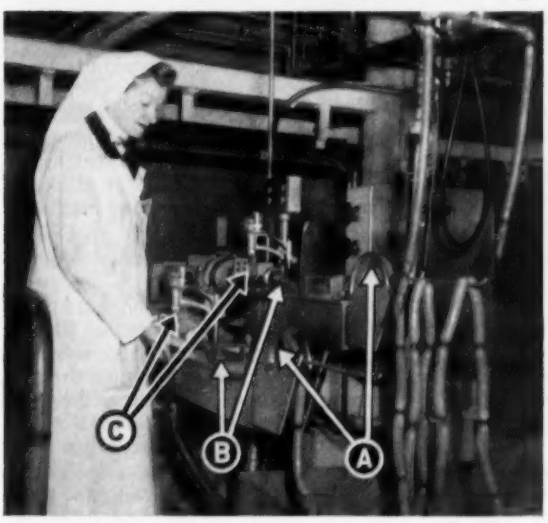


SPUN in loop-fashion inside revolving drum (A) of linking machine, linked 55-ft. strand of sausage automatically drops onto arm of 4-arm turret (B).

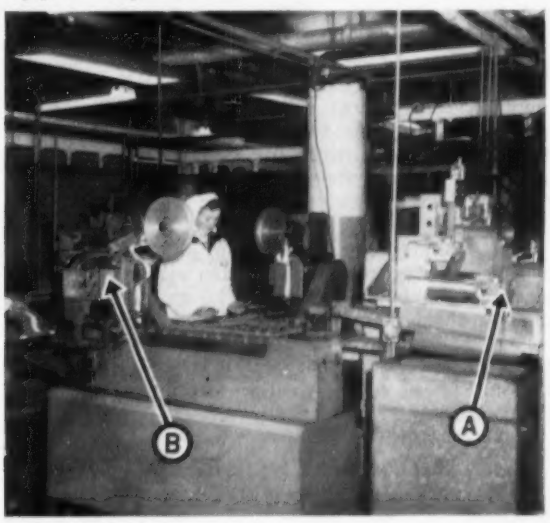


OPERATOR gives turret a quarter-turn to bring loaded stick to her work station to tie first and last links. After adjusting loops, she transfers strand to cage.

B—How Casing Stripper Operates



FEED END of stripper with two operating heads. Franks travel through two feed rolls (A), troughs (B), and revolving peeler heads (C).



DISCHARGE END. Stripped casing is chuted (A) into waste container, while skinless wieners are conveyed to Kartridg-Pak banding machine (B).

► Reduction in machine downtime and amount of attention needed by operators to run units.

► Elimination of strings, since machine operates on twist-and-spin principle. Thus, also string tying is abolished. And there is no possibility of any string getting into the meat in event of breakage of casings in the stuffing department.

► Reduction in overweight tolerance of 1-lb. packages from ½ to ¼ oz. through controlled stuffing.

► Simplification of machine-cleaning because all operating parts are exposed and easily accessible for rapid hosing with hot water. All parts in contact with meat are constructed of stainless steel, and electric motors, relays, etc., are enclosed in a stainless housing.

► Savings in floor space, since machine only takes up 5x5x9 ft. of space.

A crew of four workers operates each linker. One operates the suffer. Another feeds the 55-ft. strands of stuffed sausage meat to linking machine. The third ties the end links of each strand of casing. And the fourth transfers linked sausages to monorail-mounted smoke cages.

Now for a run-down of the operation—

The first operator places a tied end of casing over a feed-roll pulley, and the sausage then travels through a feed tube. The strand of sausage meat then actuates the feed-tube switch lever, which operates the linking machine as the sausage passes between a pair of short, horizontal conveyors.

Conveyors pull the casing forward as cam-actuated pins simultaneously pinch the frankfurters into pre-set lengths. Twisting of the sausage as it travels from conveyors to revolving head shortens the links.

At this point, the sausage continues through the rotary distributing nozzle that discharges it onto the advancing

carriage containing a rotating, retaining drum. This turning drum's centrifugal force is sufficient to hold the links against its inner surface in a neat, looped pattern.

The carriage rides on flanged stainless steel rollers, while the drum travels on synthetic, rubber-tired, eccentric-positioned rolls. Carriage is feed-chain driven when motor drive is engaged by magnetic clutch and pneumatically driven by an air cylinder when the clutch is disengaged.

Controlled Travel

After the unlinked end of the casing passes below the feed-tube switch lever, the air valve at the head end of the air cylinder is energized and the motor and clutch de-energized. Air supply to this cylinder is throttled to delay start of the carriage and to control its rate of travel to the turret end of the machine.

As the carriage (with drum rotating) reaches the end of its forward travel, the air cylinder cushion decelerates its movement to bring it to a smooth stop.

A magnetic brake stops the chain-driven rotating drum at the end of the carriage travel to permit the loops of linked sausage to fall uniformly on one of the arms of a four-arm turret. At the same time, the conveyors and distributing nozzle stop operating.

Hand-turning the turret 90 deg. each time, the operator is enabled to straighten and remove the sausage, so that she can ready herself for the next strand.

Automatic depositing of the looped, linked frankfurters onto a turret arm facilitates the task of loading them onto smoke sticks and then into smoke cages.

Just as the piston nears the end of its travel, a switch supplies air to the rod end of the cylinder and simultaneously connects head end of the cylinder to exhaust. At this stage, the carriage (drum not rotating) returns to its starting position. Rate of backward travel is controlled by a needle valve, and the cylinder cushion provides a smooth stop. Drum is now ready to receive a new strand.

Conventional processing steps are followed up to the point of stripping artificial casing from wieners. Cage loads of linked frankfurters are monorailed to smokehouses for smoking, cooking, and then rinsing. Franks are next 'railed into an air-blast cooler for rapid lowering of the temperature of the wieners to about 32 F. Then, frankfurters are held in a 40-F. cooler, awaiting machine-peeling of the cellulose casing.

Electronic Check-Weigher

ON RETAIL line paper-collared 1-lb. double layers of franks are automatically check-weighed by electronic machine (arrow), which rejects over- or under-weight packages. Girls then re-weigh off-weight packages.

Development of the Kartridg-Pak linking machine preceded development of its logical teammate—the automatic unit that air-bursts the casing seams and then knife-strips the casing from the wieners.

These machine strippers provide six notable advantages:

1. Manual peeling of wieners is completely abolished. The machine peels casing from franks at the rate of 750-950 lb. hourly—a task which if done manually would require seven to nine girls, each peeling approximately 104 lb. hourly.

2. Percentage of damaged product is lower than with hand peeling. Machine has been carefully designed to operate so no wieners are cut.

3. Knife-nipped ends are completely eliminated.

4. All links passing through the machine are stripped.

5. Machine is of sanitary construction and easy to clean.

6. Cost of stripping casing from frankfurters is reported to be significantly reduced. Hand-peeling, for example, is stated to cost about $1.76 per 100 lb. of wieners, whereas automatic stripping with this unit runs only about $0.35.

Oscar Mayer employs a number of machines, each with two peeling heads requiring but a single operator.

Each of the stripper's twisting heads operates independentally. Twisting, in a controlled fashion, the stripper automatically removes casing from linked frankfurters, inflating the linked sections, and then pulling the inflated casing over a slitting nozzle. Frankfurters then separate from the slit casing to drop on a conveyor ready for packaging. Slit casing is carried off by a pair of corrugated pull rolls and deposited in a waste container.

Now to details: The smoked, linked frankfurters are drawn from holding trav, go over a feed-roll pulley, then under a submerging roller in a 120-deg.-F. stainless steel water conditioning vat (water flow of ½ gpm.), through a diaphragm (squeegee-type) wiper, and then between a pair of vertical fingers. These fingers coordinate the action of the pull rolls and the spinning of the untwisting head.

Wieners De-Twisted

Franks are drawn through the untwisting head with the slitting-air nozzle forcing air, at a pressure of 80 psi., between casing and meat. A small flexing-roller conveyor in the untwisting head controls the franks passing through it. Function of the untwisting head is to remove the twist from the franks formed by the linking machine.

The knife-slit casing then continues between two separator rolls that free the frankfurters from the casing. Spring-loaded pull rolls, operating simultaneously with the turning of the untwisting head, engage the slit casing. A small, sharp knife within the untwisting head slits the casing.

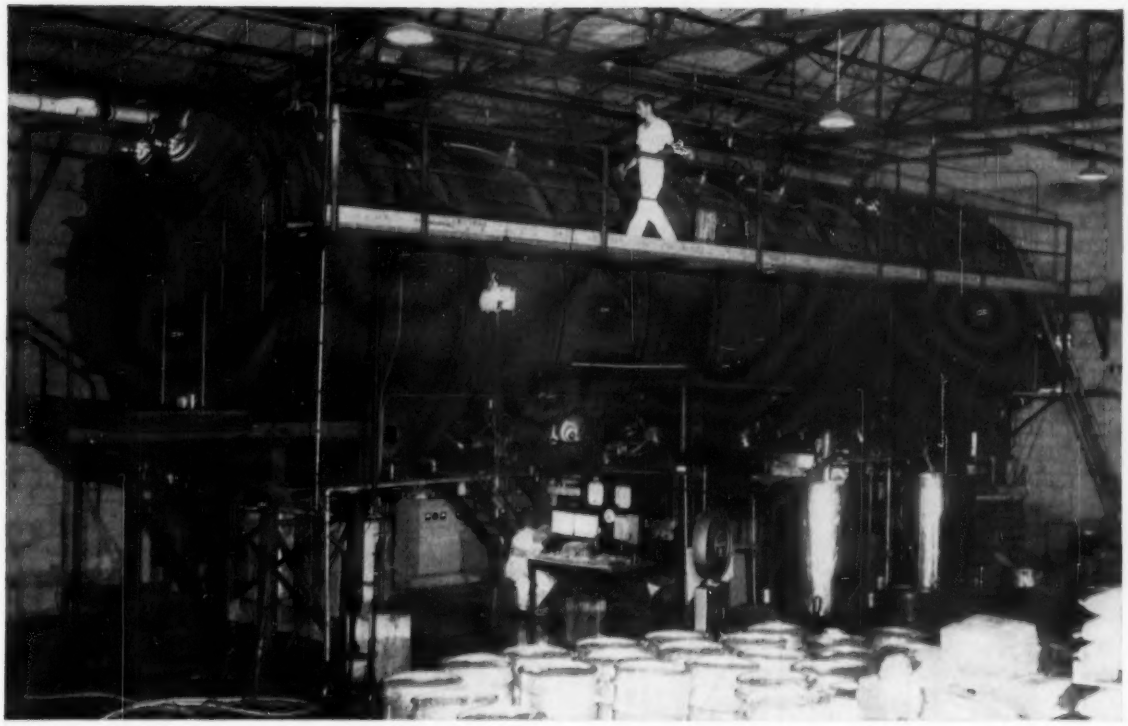
Coordination of pull rolls and untwisting head is controlled by the mechanical fingers. On closing, these microswitch-operated fingers, stop the pull rolls and, on opening, activate them. The switch opens when the pull rolls close, and it closes when the slit casing is engaged by the rolls. The fingers, on separating (riding over the franks) close the microswitch, which then energizes the pull rolls. And as the fingers fall into the necks of the links, they come together to open the switch and stop the rolls.

As stated, capacity of the dual-head striping machine is put at 750-950 lb./hr. However, technicians at the Oscar Mayer Chicago plant recorded 1,050 lb./hr. on one machine for a 1-week period. Also cited in a specific 4-hr. record of 1,350 lb./hr.

Coming from the machines, the skinless frankfurters are ready for packing into bulk (6 lb.) or retail (½ or 1 lb.) packages.

In bulk packaging, the wieners are first carried, one at a time, on a notched-type conveyor that feeds them

(*Turn to page 156*)



VACUUM DEHYDRATOR is fed by pump from the two mixers (seen right). It dries juice continuously, discharging finished product alternately into one of two receivers (seen beneath dryer at left).

Superior Dehydrated Juices

From Continuous Vacuum Process

Dry crystalline powder reconstitutes almost instantly—even in ice water. Vitamin content and nutritive level of product is high. Flavor is judged to be as fully acceptable as that of the frozen concentrate

TODAY dehydrated orange juice is again being processed commercially—this time with achievement of both process and product advantages over the earlier endeavor during World War II.

The new technique capitalizes on specific advances made in juice concentrating and juice puffing (FE Mar. 1953, p. 59). Additional processing economies and other benefits are garnered through continuous dehydrating (without employing drying aids during processing).

Product improvements include:

- Complete elimination of water content from the juice.
- Instantaneous reconstituting of dehydrated juice crystals, even in ice water
- Recovery of natural orange flavor through addition of stabilized recovered peel oils
- High retention of vitamin C (at least 96% of the vitamin in the concentrate)
- Approval of flavor, has been the decision of panels having rated the powder on a par with concentrates of best quality.

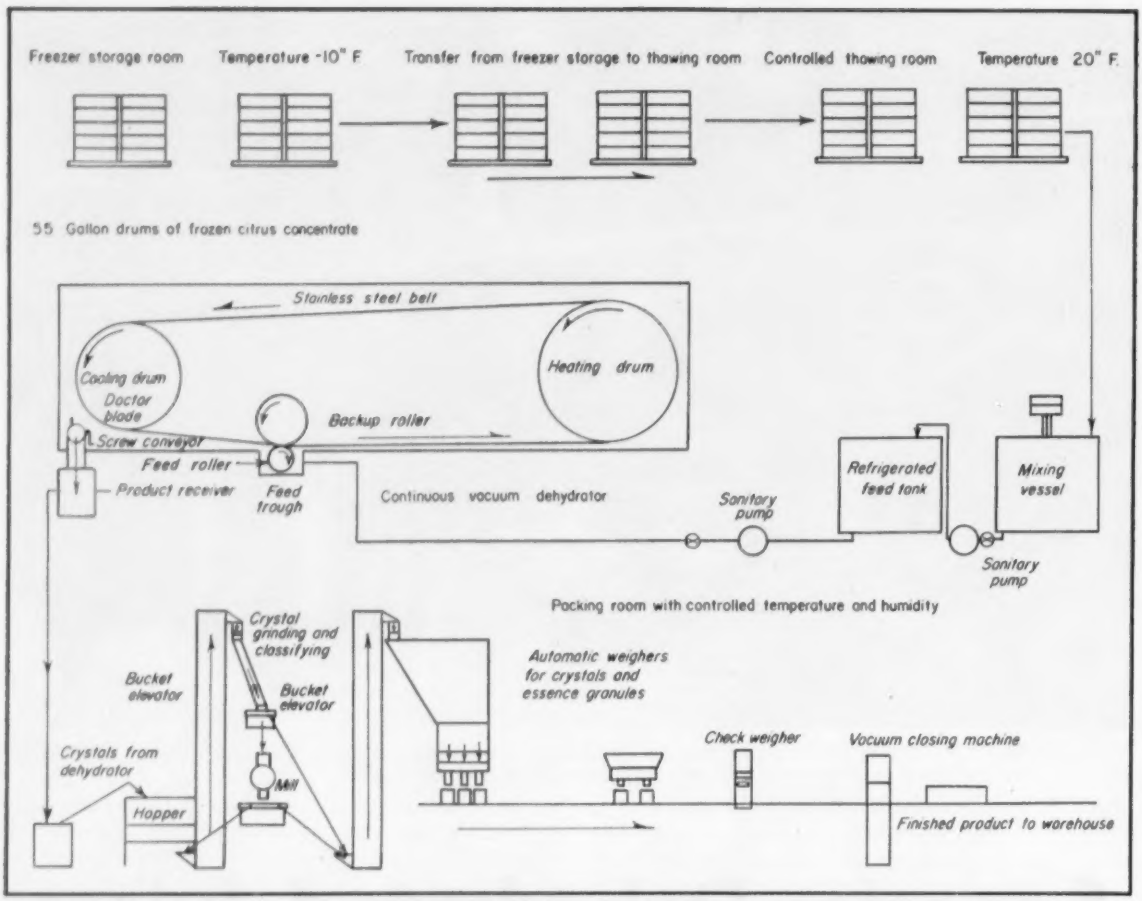
Shortly after the war's end, commercial dehydration of orange juice was discontinued. The dry products' most important customer, the government, cancelled future orders.

Furthermore, a suitable consumer market for the dry juice had not been established. There were three notable reasons:

1. At that time, the public had put "thumbs down" on practically all dehydrated foods.

2. Economies of commercial methods then appeared unfavorable.

3. Growing acceptance of frozen foods in general, and of the good taste and quality of frozen orange juice concentrate in particular—made the latter the commercial choice.



FLOWSHEET of orange juice dehydration starts with juice concentrated to 58% solids. This is stored at —10 deg. F. until dried. Equipment is compact, operations controlled, labor requirements low.

Despite the flagging interest, USDA's Western Regional Laboratory, Albany, Calif., continued intensive research in an attempt to develop a satisfactory method of dehydrating orange juice.

Result of the laboratory's efforts was a batch process for puff-drying the juice with the help of a drying aid. This strongly interested the Army Quartermasters Corps, which decided to have it evaluated in an Industrial Preparedness Study.

Thus, in 1952, Vacu-Dry Co., Oakland, Calif., was selected (on the basis of its experience in the vacuum dehydration of fruit and fruit products) to conduct the study.

Outcome was 10,000 lb. of orange powder for the Quartermasters Corps and a continuous process for providing dehydrated juice, without drying aids, at a cost such that it could be marketed, after shipment, competitively with canned single-strength juice.

How It's Done

Here's the way Vacu-Dry's subsidiary, Orange Crystals, Inc., Plant City, Fla., dehydrates orange juice—

First, a concentrate of 58% total solids is prepared in the nearby plant of J. William Horsey Corp., and there immediately frozen and stored at —10 deg. F. Then as needed for further processing at the dehydrating plant, frozen product in 55-gal. drums is brought to the drying plant's thawing room. Here it is poured into a mixer where the concentrate is stabilized with sodium bisulfite. Sulfur dioxide fumes escape, leaving virtually undetectable traces in the finished product. After this treatment, concentrate is pumped to the dehydrator feed tank and there maintained, refrigerated at 20 deg. F.

The vacuum dryer (a Chain Belt Co. product) is a cylinder of 12-ft. dia. and more than 50-ft. length, reinforced by circular ribs and supported 6 ft. above the floor on six columns.

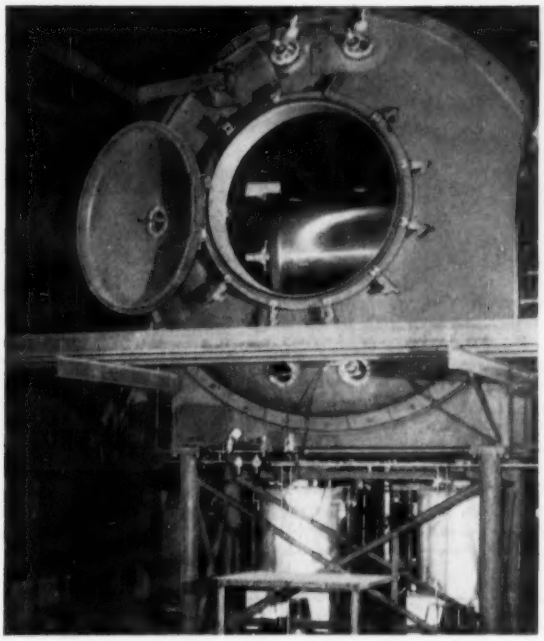
In convenient position, glass ports, reached by catwalk, permit visual inspection of drying operations.

Most of the controls of the dehydrator, which is designed for one-man operation, are automatic. They are located on a central control panel, where automatic charting devices continually record dehydration progress.

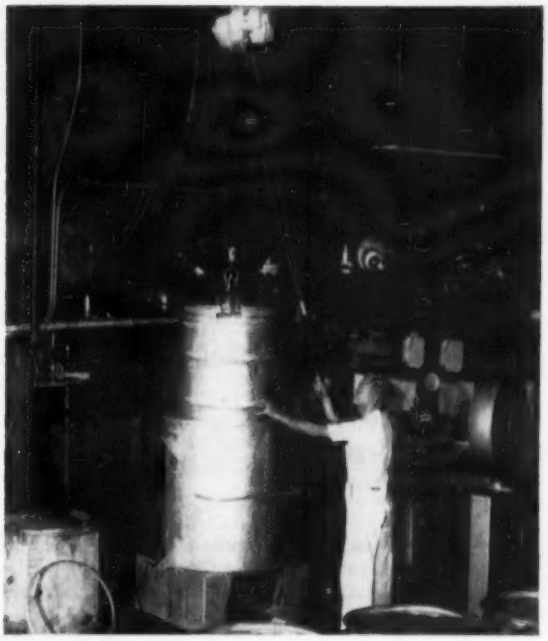
Concentrate is pumped from the feed tank into the vacuum chamber. Here it enters a stainless trough where level is maintained by float-valve control. And it is then transferred to the drying belt by roller, lower portion of which is submerged in the concentrate.

Speed of the endless stainless drying belt, which runs from one end of the dehydrator to the other over two drums, can be varied as required. Complete dehydration requires but a few minutes, after which dry crystals are removed from the belt by the action of an oscillating doctor blade.

Crystalline product drops into a screw conveyor for discharge into one of two receivers. In turn, each receiver can be disconnected, when filled, from the dryer and sealed against the atmosphere for transportation to the dry room (held at less than 20% RH), where concentrates are



PRODUCT RECEIVERS below dryer are held in place by hydraulic lifts. They are filled alternately.



RECEPTACLE for collecting dehydrated crystals is a drum inside container. It is sealed to dryer.

dumped into a hopper. All milling and packaging operations take place in the controlled atmosphere of the dry room.

From hopper to vibrating classifying screen, product is transferred by bucket elevator. Oversized crystals are bypassed to a mill for reduction to proper particle size and returned.

Essence granules are volumetrically added to the can in which the product is packaged. Dry juice crystals are filled by automatic net weigher and then vacuum closed.

Essence granules are used to restore the volatile aroma constituents that evaporated with water during vacuum concentrating and subsequent dehydration of the juice. In effect the granules are the solid analogue to the single-strength juice added by the frozen concentrate processors for essence restoration of vacuum concentrated juice.

Essence component of granules is high-quality cold-pressed citrus oils that are entrapped as minute globules in sorbitol, a partially hydrogenated dextrose.

Solid sorbitol acts as a hermetic barrier and prevents oxidation rancidification of entrapped oil. During reconstitution, these extremely small droplets of oil are released in a fine suspension throughout the liquid and thus impart a fresh, typical aroma to the juice.

PALLETIZED CASES of finished product are transported and warehoused without need of refrigeration.

Advantage of Puff-Drying

Continuous dehydration, to achieve a puff-dried product, can be applied to at least some other juices as well as the juices of all citrus fruits. Specific process control is necessary to attain puffing during drying. Degree of puffing is also subject to close control.

Vacuum is required for puffing, but vacuum precludes the possibility of any oxidation changes that would impair product quality.

As the juice puffs, surface area is tremendously increased. Thus the rate of evaporation is speeded and with it the product cooling rate resulting from the evaporation. Very rapid high-vacuum low-temperature evaporation results.

Reducing processing time to a relatively short interval (a few minutes) safeguards color, taste, and quality in general. This means that there is virtually no vitamin loss during drying. Even after 6 months storage at 100 deg. F., vitamin content remained 90% of that of the concentrate from which the puff-dried product was made. Of course, the porous, friable end product structure accounts for the rapid reconstituting rate.

Desiccant in Package

Under favorable storage conditions loss of vitamin content and other quality characteristics are negligible.

(Turn to page 164)

To Fit Operations Into Older Buildings . . .

By applying these three salient principles you can lay out modern high-output processing lines in existing structures of varied—or even mongrel—design. What's more, these practical working doctrines can win you a good number of extra-efficiency advantages

STANLEY B. HENRICI
Head, Industrial Engineering,
H. J. Heinz Co., Pittsburgh

Food-company engineers frequently face the tough task of installing modern food-processing equipment and layouts into long-standing structures that never were designed for the purpose.

And needless to say, these endeavors can raise complexities of a far greater magnitude than those encountered in fitting operations into a new building.

In solving such problems at H. J. Heinz Co., we've taken recourse to certain principles which are not entirely in agreement with those generally recommended for plant layouts in new buildings.

In new buildings it is customary to think of straight-line flow, no backtracking, use of overhead space, plenty of room for expansion and future changes, and adequate space for all storage and activities that may be necessary.

But in an old plant you think of quite different things. You accumulate working principles that vary considerably.

I propose to discuss these working doctrines and give a number of pertinent plant examples.

Divide (Cut Up)

The first of these recourse principles is "Divide." In following this practice one pursues the policy expressed in the Latin phrase *Divide et impera*. This is translated as "Divide and rule"—but for our purposes it may be interpreted as "Divide in order to control."

Here's how this principle may be put into practice: Assume you have an operation for which you must make a layout, and that the proposed setup just won't fit into the space available. Applying the "Divide" idea, the operation might be considered as being blown up into its component pieces like an exploded drawing. And thus it is possible to find a way to fit each component into available—though not necessarily adjacent—factory locations.

And now an example: A few years ago we razed one of our older buildings in which jelly had been manufactured. Here we had hauled sugar and jelly ingredients up to the top floor of a seven-story building, there mixed and heated these ingredients in kettles, and then dropped the resulting product through the floor to another set of kettles, where they were finished. Then the jelly was again dropped through the next lower floor and into the filling machine receiver.

When the jars of product emerged from the filling machine and had been capped, it was necessary to put them through a long cooling unit in which the temperature of the product was reduced to a level sufficient for solidifica-

Divide →

PROBLEM—Several years ago, Heinz razed one of its older plants in which jelly had been processed (depicted on left in diagram). And pressed for space, the company was forced to relocate this operation in two other buildings (right) with the particular challenge of reducing handling.

ANSWER—The first battery of kettles was placed on a lower floor of the first of the two buildings, near the shipping dock—thus enabling direct movement of ingredients from trucks into mixing and heating kettles. Jelly then is pumped to the top floor of the adjoining building—saving the numerous, tedious elevator trips needed in the former operation. From the upper kettles, finished product drops another level for filling and cooling on the floor directly below.

Combine →

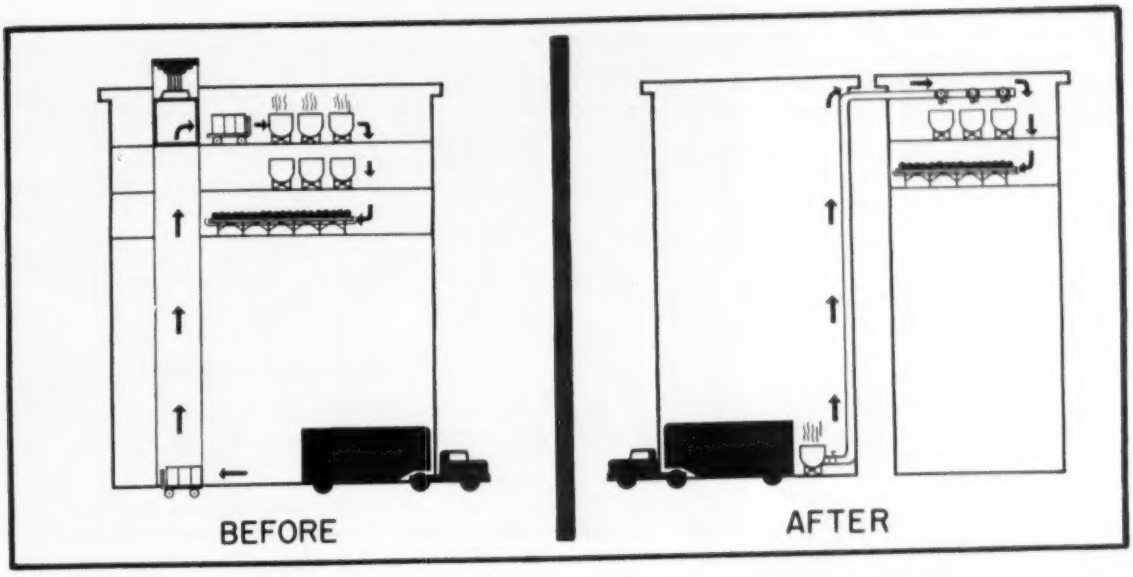
PROBLEM—At once of the company's locations there were several buildings, each incorporating the processing of a group of related food products. And a revamping was imperative to save space.

ANSWER—It was noted that though methods of preparing materials and can filling differed, the systems of labeling and packing cans in cartons were the same. So all labeling and packing were combined as a single operation in Area 5 (as seen on right in diagram), replacing the old multiple setup in Areas 1-4 (left in diagram). Then conveyors were installed to haul the cans to the single location from the several buildings. Now the same volume of cans is labeled and packed with less equipment. Moreover, less indirect labor is needed, and direct labor is able to operate in a manner that is more efficient.

Remove →

PROBLEM—Big tanks, set up in the midst of food operations, are not only very cumbersome but constantly pose inconveniences. A specific setup at Heinz involved two 1,500-gal. vinegar tanks on different floors, where they cramped operations by restricting needed working space.

ANSWER—It is the ingredient, not the tank, that is required at the operation. So company engineers removed the tanks to the roof—well out of the way—and ran pipes down from them to supply the vinegar. This brought great savings in working-floor space and eliminated the former clutter.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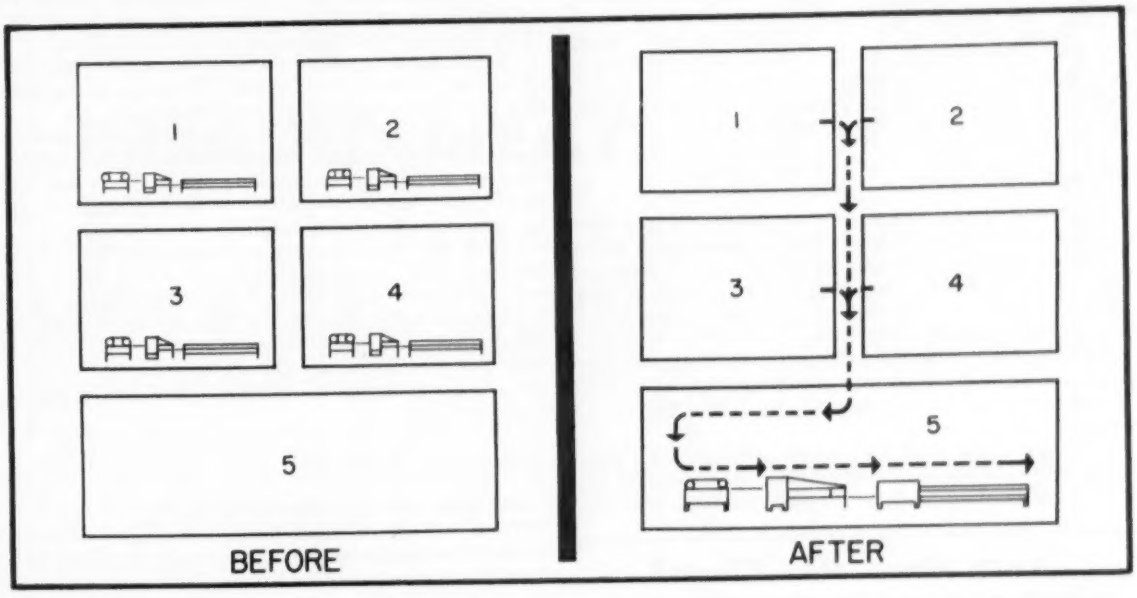
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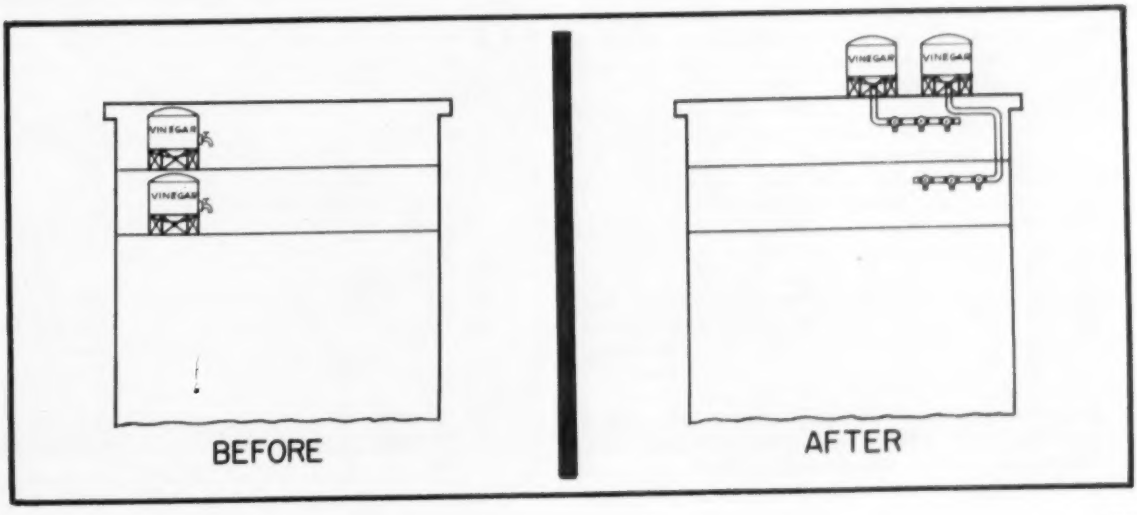
VINEGAR
VINEGAR
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tion of the contents and for packing of the jars into cartons.

Point was that when this building was torn down, we were require to find a place in which to put the operation. And, of course, we were immediately up against the fact that nearly every building available was already filled with other activities.

Our solution was to split up the entire process and conduct the operations in different locations. We no longer attempted to integrate it in one spot, but "opened the whole thing out."

In so doing, we were able to find space in which to put the various pieces of equipment. At the same time we were fortunate in being able to reduce the amount of handling required.

What we did was put the first battery of kettles on a lower floor not far from a shipping dock. In this location it was possible to haul the ingredients directly from the trucks in which they arrived to the kettles in which they were to be mixed and heated. Saved was much work formerly required in handling, lifting by way of elevators, and then re-stacking.

On an upper floor in an adjacent building we found a place where we could spot the reheat kettles. No great problem was involved in pumping the jelly from the lower floor in one building to these kettles on an upper floor in another building.

Thus we found that a simple pipe line was able to replace elevators—eliminating many elevator trips previously required when raw ingredients, as such, were transported up several floors. As before we dropped the finished jelly from the kettles to the filler on the floor below.

Drying-Room Enigma

Another case history involves manufacture of paste-type products. Our company already had a department in which spaghetti was manufactured. Employed was an extrusion press from which the wet dough was pressed in long strings, feeding to a series of rooms in which the dough was gradually dried for one to two days.

This equipment occupied the entire floor of a building. In the course of time, our sales department learned it could develop a good market for macaroni in addition to spaghetti.

The same press could be used for extruding both products. But this required finding space for a considerable number of additional dry rooms for the macaroni. Needless to say no such space was available in the original location. Neither was it desirable to move all the existing dry rooms and presses to another area.

Solution to this problem: The new macaroni dry rooms were installed in another building nearby. The macaroni, after being extruded from the press, was blown to this second building through a duct.

These cases illustrate the benefits of solving problems arising from old plant layouts by means of dividing operations into components.

In both cases the answer was to split up, use separate locations, and employ economical means of transportating materials from one spot to another.

What About *New Plants?*

"Recently, a building authority declared that the plant of the future will be engineered to the product which is to be manufactured in it. He said that even the materials handling—rather materials movement—would be engineered into the building itself.

"Well, it doesn't require excessive experience to know what is going to happen. For the next 10 yr. that factory is going to be the very best plant that anyone could ever have imagined. And that factory will, no doubt, be in operation for the next 50 yr.

"But the product or products that are made in it will undoubtedly change, perhaps even before the first 5 yr. are up.

"And then some poor industrial engineer is going to have to sit down with his pencil and slide rule and triangles. He'll have to endeavor to figure how to produce an entirely new or redesigned product in that building which was specifically engineered for making the original product.

"And believe me, that industrial engineer is going to have as much fun with that so-called new plant as we have today with plants two or three decades old."—*S.B.H.*

Combine (Team Up)

Second principle that we employ in redesign of old plant layouts is quite the opposite of the above. This time it is "Combining"—always resulting in a real saving of space.

At one of our manufacturing locations there were several buildings, in each of which a group of related food products was manufactured. Although there were some differences in preparing the various materials and filling the containers, the method of labeling and packing the cans in cartons was substantially the same in all buildings.

In this case the problem involved a series of spotty little operations scattered over several city blocks in buildings that had been erected at different times.

In untangling this situation, modern materials handling methods helped alleviate the difficulties. We decided to combine all labeling and packing operations in one location. Conveyors were installed to haul the cans to this location from the several buildings.

When the move was completed we found that we could label and pack the same volume of cans as before with less equipment. Also, through this centrallization much less indirect labor was required, and the direct labor was able to operate at greatly increased efficiency. Our savings from this move alone ran into six figures a year.

So, the answer lay in combining duplicate operations into one.

Conveyors vs. Trucks

And now, here is another instance of combining:

In one of our buildings we produced cases of canned goods which had to be stored in a warehouse about 1,000 ft. distant. At one time we had used tractor trains to haul the merchandise from one location to another. However, volume was being augmented to a point where the mere traffic problem alone would be of considerable importance.

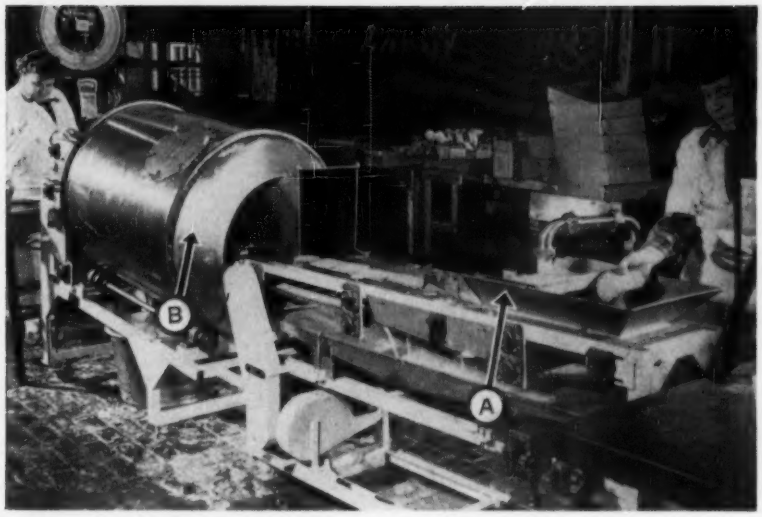
The small trucks, moving in the aisles of the buildings and over bridges between them, would get in the way of other operations. Calculations were then made, and it was found that it would be less expensive to install a conveyor system in this particular case.

As a matter of fact, cost of the conveyors was less than the investment cost of trucks and tractors, and in addition there was also a saving credited to reduced labor. Accordingly, we installed a complex network of conveyors in the manufacturing building.

Using this system, cases of canned goods are collected from one packing line until there are enough for a pallet load. Then they are released in pallet-load quantities to trunk line conveyors, which rush them from the manufacturing building into the warehouse, where an automatic pallet loader is located.

This is an instance of an old-fashioned layout forcing us into the use of a good principle—that of com-

(*Turn to page 154*)



FULLY AUTOMATIC line at Armour and Company's Kansas City plant can bread up to 1,000 lb. of 4-oz. portions of trimmed meats per hour. First coated with batter in unit (A), meats are then breaded in drum (B).

Armour Pioneers

BREADED MEATS

FE STAFF

Automatic batter dipping and breading machines—originally developed for shrimp and fish, then later adopted for cut-up poultry—now have new work: Batter-covering and bread-coating meats.

Pioneering this breading of meats is Armour and Company. And typical of the meats this progressive firm is breading are pork and veal cutlets, veal grill steaks, and boneless pork chops—with more varieties yet to come.

The breaded meats were launched in bulk packages (40 or 42 pieces of 4-oz. size for the institutional trade). And now some are also being packed in smaller packages for the retail trade.

Primary purpose of preparing frozen breaded meats is to provide operators of hotels, restaurants, and institutions with convenient, ready-to-cook items that simplify meal planning and preparation. No longer do these consumers have to face the tedious task of cutting and weighing uniform portions of meats and then batter-dipping and breading them.

▶ There are other advantages for users, too. No waste need be trimmed from the meats, since every pound purchased can be cooked and served. What's more, there's no excess fat to dispose. Nor is valuable time and space wasted, especially the space for holding large cuts of meats prior to preparation.

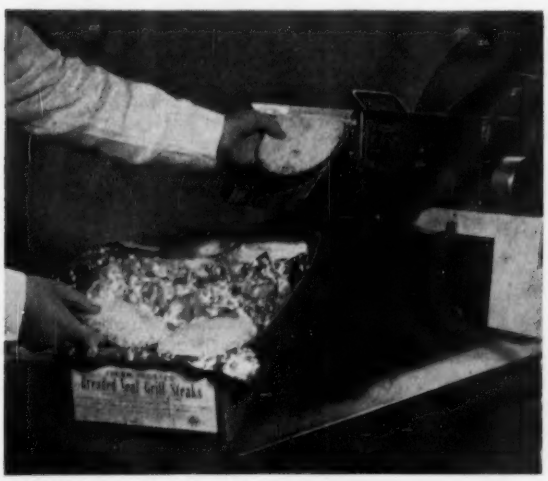
▶ Of equal importance, such pre-sized breaded items provide simple, accurate method of figuring portion costs and so maintaining tight inventory control. Also, supply of these meats can be flexible enough so that an operator can meet any sudden busy period without risk of spoilage losses due to overstocking. And there are no losses from too-big portions or ill-will from too-small portions.

Breading operations at Armour's Kansas City plant give the picture:

Meats first are carefully cut and trimmed, by skilled butchers, into the 4-oz. pieces. These are then fed to the fully automatic batter dipping and breading machines (made by Downyflake Bread Mix Div., Doughnut Corp. of America, Oakland, Calif.). Up to 1,000 lb. of meat are put through hourly.

Batter mix is fed initially into the dip pan of the first machine. From

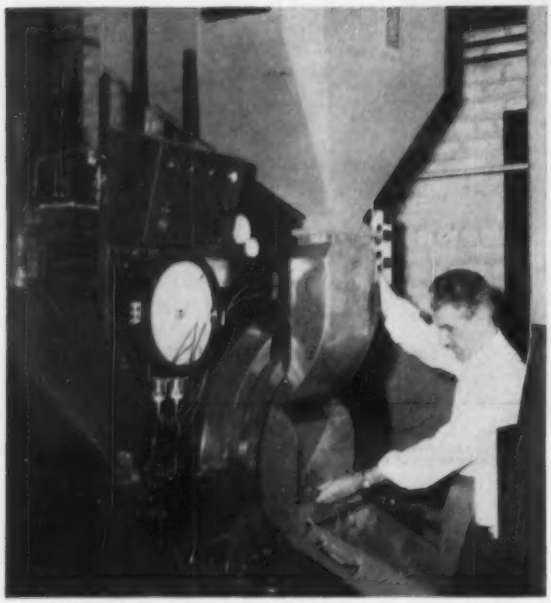
(*Turn to page 180*)



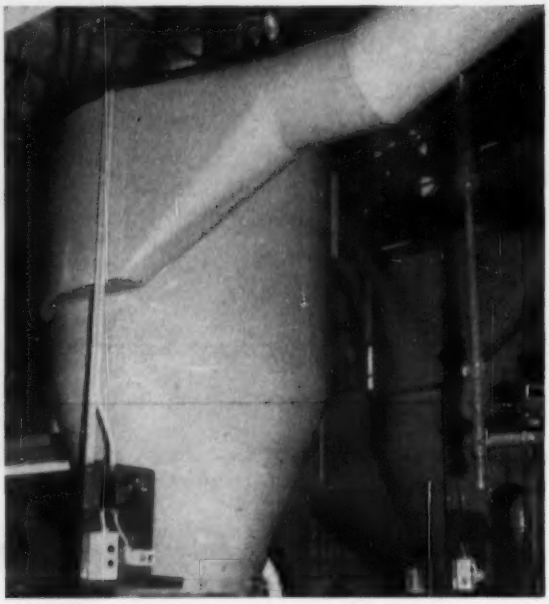
COMING from breader (right), meats are packed in foil-lined cartons. Seen are veal steaks.

PACKAGED meats are next loaded on portable racks (right), which go into sub-zero freezer (left).

"Roboted" Roasting



AUTOMATIC controls on batch-type roaster provide correct process time and temperature. Roasted coffee is discharged to rotary cooler (right).



SPECIAL feature is smoke-and-odor control unit. Cyclone collects liberated chaff from roaster. Pilot jet (top) burns fumes at 2,000 F.

Premium-Price Success Built on Quality Control

Multi-purpose item and process innovations also contribute to coffee company's quick gains. Pushbutton blending and odor control utilized

LEONARD TRAUBERMAN
Assistant Editor, "Food Engineering"

Quality control has paid two big dividends for Chock Full O' Nuts Coffee Co., New York City.

1. A little more than a year ago, Q. C. assured success of the premium-priced line of conventional coffee griads with which this company entered the highly competitive Metropolitan New York market. For despite higher selling price, consumer acceptance quickly placed the brand among the forerunners in vacuum-packed sales.

2. Then recently, quality control enabled the company to launch its new "all method grind", which now replaces the three grinds formerly offered. Using this special single-grind product, coffee may be prepared by any of the common methods—percolator, drip, or vacuum.

Key to success of the new product is precise control of the grinding process to assure a fixed ratio of particle sizes. But at Chock Full O' Nuts, the control extends from the purchase of green coffee to inclusion of a plastic measuring cup in each can of the finished product.

Straight-Through System

Implementing this program is a modern, new single-story plant. All process equipment is of the latest type and plant layout permits efficient, straight-through product flow.

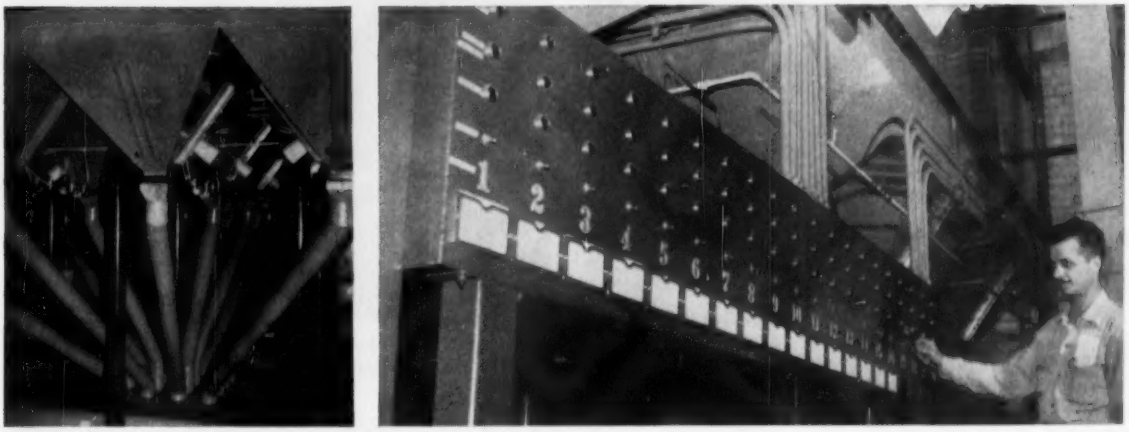
How quality control is applied in this advanced coffee operation may be seen by following the product through the various processing steps:

Selection and testing of green coffee is the first phase. By pricing its coffee at a premium, this company is in a position to use costlier coffees to get its premium blend. This blending may involve as many as six to eight different coffee types.

Before green coffee is consigned to processing, representative samples of each lot are sent to the laboratory, which includes a pilot plant. After routine analysis, batches are compounded by roasting individual bean types, then blending and grinding. Finally, ground coffees are brewed for cup tests and evaluated by an expert taste panel.

Blending formulas established are then translated to plant-scale batch size. And data compiled in the pilot procedures are used to direct subsequent plant operations.

"Toggled" Blending and "Ratio" Grinding



BIN AND CONTROLS. Left: Multi-compartment bin for roasted coffee permits separate storage of the beans prior to blending. Ducts lead to blender scale hopper. Right: Toggle switches on control panel energize solenoid valves to operate slide valves releasing beans from various storage compartments.

When assigned to processing, 150-lb. bags of green coffee are dumped through a floor chute that leads to a vibrating-screen and air-separator system. After separation and rejection of foreign substances, beans are elevated to storage hoppers and are ready for roasting.

Roasting Before Blending

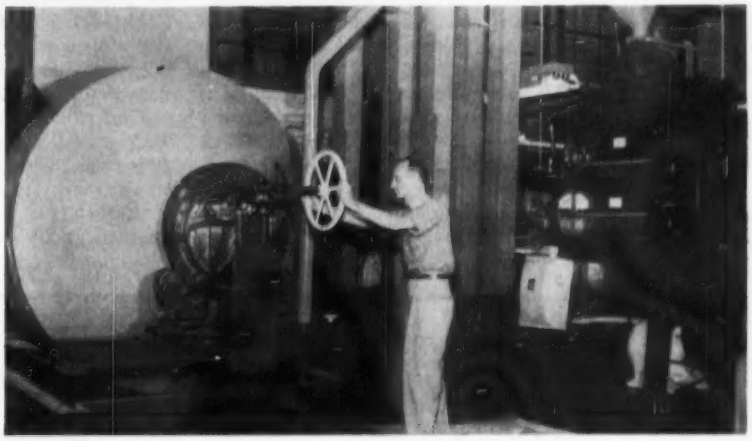
An important part of quality control is roasting before blending. This permits each type of bean to be roasted according to its individual requirement. Only by varying roasting time and temperature to suit the type, source, and age of the bean, can its particular flavor best be developed. For example, some raw coffees are riper than others and require less roasting for maximum flavor.

From the storage hoppers, accurately scaled 550-lb. charges of green coffee are delivered to a battery of roasters. Although recording thermometer and controller units provide automatic control of the roasting cycle, progress of the roast is checked periodically by sampling.

Roasting temperatures range from 400 to 425 deg. F., and the operation takes about 20 min. In the process, beans lose about 16% of their weight —a loss mainly comprising moisture, volatile matter, and chaff (bean's outer coat).

Roasters are designed to expand the bean's cell structure early in the cycle while the bean is still soft and pliant. This prevents case-hardening. Cross section of a properly roasted bean is uniform in color and has a minimum of cracks and hollow spaces.

Liberated chaff and other byproducts of roasting are continuously removed by a specially designed smoke and odor control unit—without using heated gases for conveying purposes. Air is introduced into a scavenging passage around the lower half of the roasting cylinder but does not enter it.



CYLINDRICAL blender (left) assures batch uniformity. Sieve tests at grinder (right) check ground coffee for proportioning grind sizes.

As exhaust fumes come from the roasters, they enter a cyclone in which chaff is separated. Gas stream then continues on to a combustion chamber. Pilot jets in the stack ignite the fumes, which burn at a temperature of 1,800 to 2,000 deg. F. Chaff and condensed vapors are collected in a receptacle at the bottom of the unit.

Combustion is complete, with nothing but water vapor and carbon dioxide exhausted from the stack. Furthermore, this system has the approval of the Department of Air Pollution Control, New York City.

Equally impressive from the Q.C. standpoint is use of stainless steel for all parts of the roaster that are subject to metallic contamination and corrosion. Furthermore, sanitary construction permits easy dismantling for cleaning and maintenance.

At the proper end-point of the roasting cycle, automatic controls admit quench water which cools the beans to approximately 180 F. Roasted coffee is then transferred to rotary cooling cylinders which further reduce the temperature to 100 F. Cooling is by air sucked through the rotating beans at high velocity.

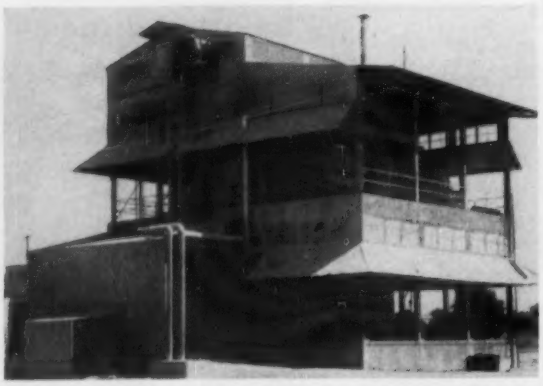
Cool beans drop to a bin beneath the floor level. From here they are fed to a second separating unit known as a "stoner". This consists of a magnetic separator and an air-conveyor system that is adjusted to elevate nothing heavier than the roasted coffee beans. Therefore, any foreign matter picked up after the initial screening is eliminated. The stoner system conveys roasted beans to the main storage bins.

These bins are of unique design.

(Turn to page 188)

Advanced Design Spurs Oil Yield

Batch-type solvent extraction of rice bran, employing process that overcomes fines problem, gives higher quality oil. Solvent is reused, and bran is sold for feed . . . Invites eyes of other extractors



OPEN-TYPE 3-level structure gives maximum ventilation, reduces hazards associated with use of hexanes.

ROBERT R. MICKUS
Manager, Research & Promotion, Rice Growers Assn. of California, Sacramento

Top performance in recovering high-grade oil from rice bran has been achieved by the Rice Growers Assn. of California, Sacramento. And notable operation dividends have followed—savings in money and labor through use of simple yet versatile equipment.

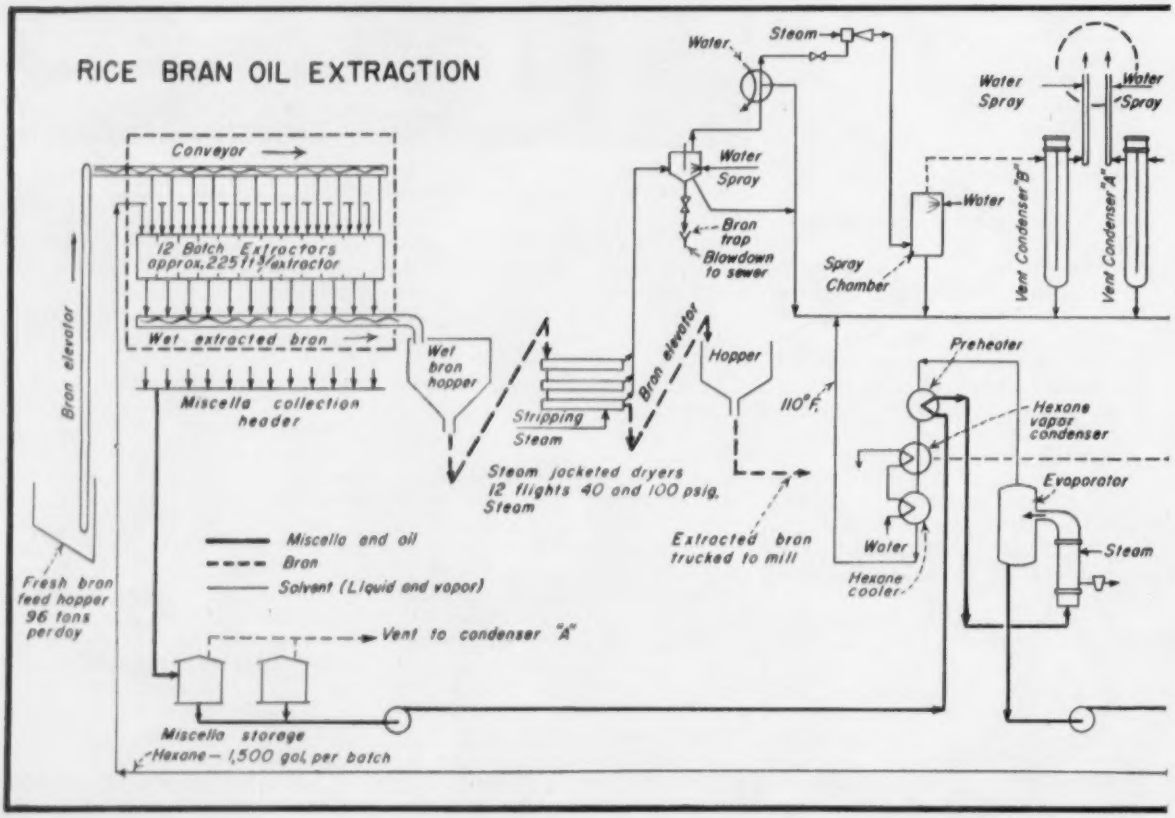
As is so often the case, however, it "took considerable doing." There were long initial studies and painstaking tests to distinguish the optimum process. Then a full program of equipment design.

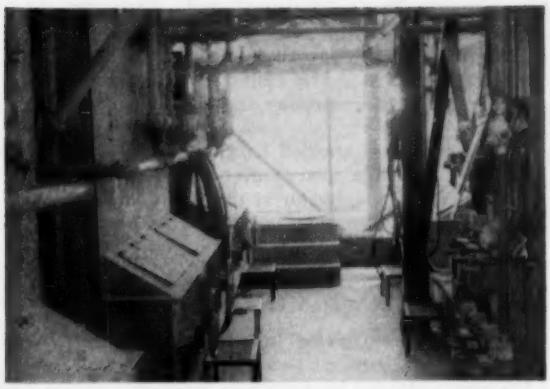
This is the story of the way it worked out in the Association's new solvent extraction plant—a facility standing in sharp contrast to the group's 1935 operation, an effort that was abandoned because of low yield, further crimped by reduced prices for vegetable oil.

Built and put into action in 1949, the new plant has since turned out more than 18,000,000 lb. of crude oil for the domestic market.

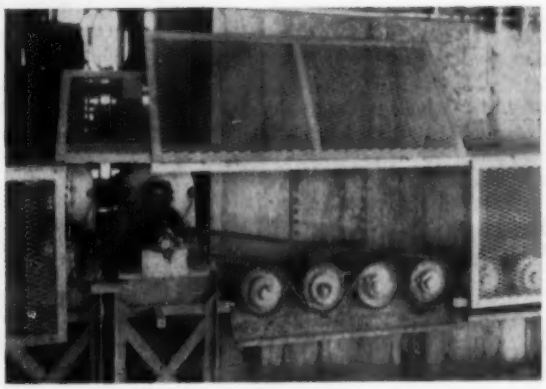
About 8.5% of the rough or paddy rice is bran. It is the outer portion and germ of the dehulled rice grain. Oil contained in rice bran is a high-grade edible product, very similar to cottonseed, soybean, and peanut oils. It can be refined and bleached to a clear, light-colored oil with good flavor, suitable for use in salads and cooking. It is stable, odorless, neutral, and more resistant to oxidation or rancidity than most cooking oils.

Further, rice bran oil blends exceptionally well with olive oil, producing a fine salad or cooking oil.





SOLVENT is metered to pipe system that feeds batch extractors. Note top of wet bran hopper (rear).



SCREW CONVEYORS that discharge bran from extractors are chain-driven from individual motors.

In the common method of milling, bran is pulverized so that about 25% passes through a 100-mesh screen and some 10% is retained on an 18-mesh screen (Tyler).

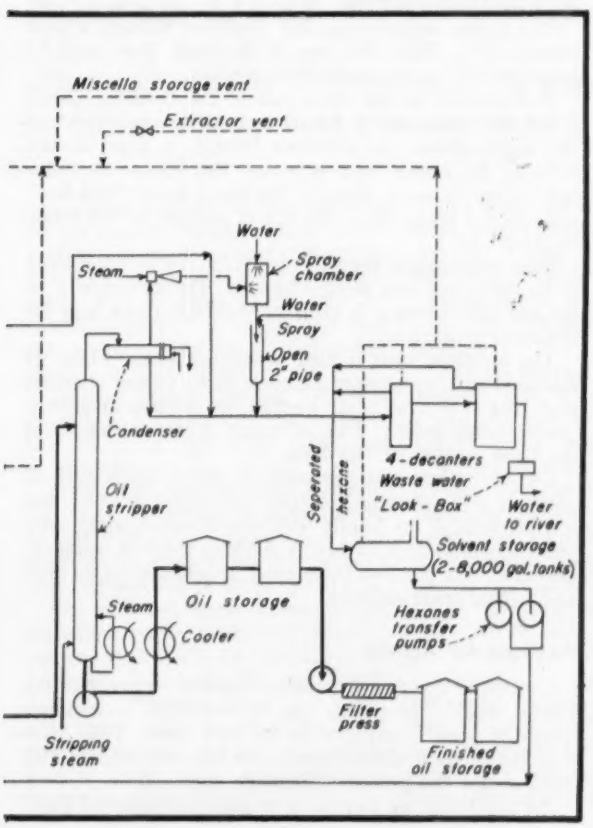
Coming now to the extraction, the Association's preliminary tests showed that the finely divided nature of bran did not lend itself to *continuous* solvent extraction. Instead, it appeared that a *batch* technique, in which fines would not present a problem, would be most efficient.

Cellular structure of the pulverized bran is such that the solvent has relatively ready access to the oil. It does not pose a need for specialized–and expensive–preparation equipment such as that used for cottonseed, soybeans, and other oil-bearing materials.

In addition, the tests established that a batch extraction process provides these three other advantages: (1) Low initial investment, (2) flexibility with regard to tonnage processed, and (3) simplicity of equipment.

Moreover, a batch type plant can be operated by less-skilled personnel. And, if desired, it can be changed over to process some other oil-bearing materials with a minimum of readjustment.

In the process, bran is trucked from adjacent rice mill to the extraction plant, which uses commercial mixed hexanes as solvents. Due to the volatile, combustible character of these solvents, personnel safety is of utmost importance. And for economy of operation, the system is designed to permit a high degree of solvent recovery following its use. (See accompanying drawing.)



Tracing the Operation

Bran is loaded in rectangular batch-type extractors and, after temperature adjustment, hexane is added in proper proportion. The solvent is allowed to percolate through the mass until it disappears from the surface. The interval for this cycle does not exceed 6 hr. from the time the extractor is loaded until the load is completely drained and ready for discharge to meal dryers.

Combined solvent and oil (miscella) flows from three outlets in the extractor floor to a collection header, then to a settling chamber consisting of a tank within a tank. Outer tank has a cone-shaped bottom, inner one has an open bottom.

Miscella enters top of inner tank, flows down its entire depth, passes out the bottom, and moves up between inner and outer tank walls to overflow to the storage tanks. Reduction in flow velocity here causes fine bran particles that have passed through extractor screen to settle out in outer tank's cone-shaped bottom. Settlings are pumped back to the extractors.

A further settling of fine particles occurs in miscella storage vessels. A 24 in. riser, placed in the outlet at the bottom of each tank, prevents material from flowing to the distillation equipment. This settled material is also pumped to the extractors for recovery.

From storage tanks the miscella is transferred by a single-stage, turbine-type pump to a preheater. (All pumps were supplied by Pacific Pumping Co.) Hot hexane vapors from the miscella evaporator are used as a heating medium for this preheater. Simultaneously, the hot vapors are partially cooled by the incoming miscella before they enter the condenser.

Miscella from the preheater, at about 115 deg. F., flows to the evaporator (Oscar Krenz, Inc.). This is a long-tube, up-draft unit with thermosyphon circulation. Here, miscella is heated to 180 deg. F., and approximately 90% of the solvent is vaporized.

The oil is pumped to a stripping column of the perforated plate design using a thermosyphon reboiler as a heat source. In addition to the reboiler, which is located at the bottom of the column, steam is injected directly in the oil stream to remove final traces of solvent. Here, under a vacuum of 15 in. Hg, remaining solvent and excess moisture are removed, leaving only a trace of hexane and less than 0.2% moisture.

From the bottom of the column, oil is pumped to storage tanks and cooled to 70 deg. F. Then it is pumped to a feed tank on the third level of the plant, and flows by gravity to a 38-plate filter press (Shriver). Filtering media, nylon sheeting, and two layers of buffalo Kraft paper, removes gums, waxes, phosphatides, and residual bran particles. The crude oil is then stored in tanks to await shipment.

Equipment Design

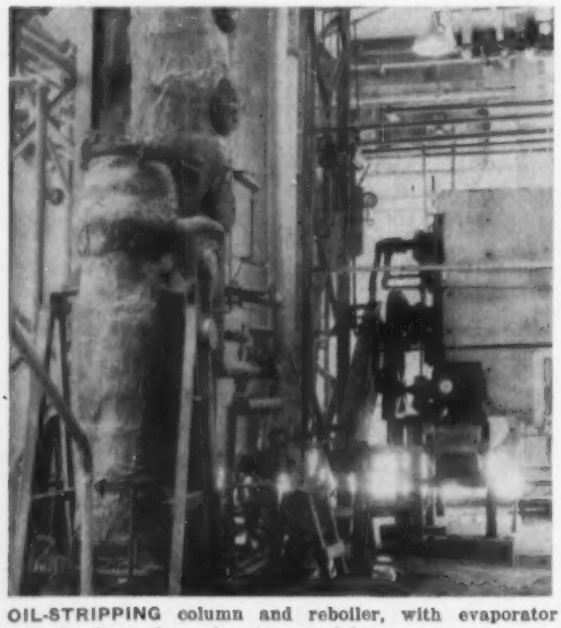
The six welded steel extractors (7 ft. 1¾ in. wide, 10 ft. ¼ in. long, 7 ft. 1¾ in. high) are each divided in the center making twelve units (3 ft. 6½ in. wide).

A 100-mesh, stainless steel screen, supported by bar grating, comprises the base on which bran is charged. Screens are in three sections, connected by an over-lapping, screw-fastened plate. The bar grating, which allows free flow of miscella, rests upon the steel plate floor of the chamber. The screen is also supported by 2 in. wide bracket welded to the side and front walls, and to a cover plate attached to the rear wall. Bracket is ¾ in. above floor of chamber and is gasketed with sponge Neoprene which, with the weight of the extraction load on the screen, forms a positive seal, preventing bran from leaking into the liquid system. Cover plate permits ready access to the chamber for removing screens or bar gratings.

Immediately above the screen are four sectional-flight screw-conveyors (Link-Belt) of 10 in. dia. with 5 in. pitch. Flights are alternatively righthand and lefthand. Roller-bearing pillow-blocks for shafts of these conveyors have special iron stuffing boxes, complete with bronze cast-iron stuffing glands (Oillite) using ⅛ in. Neoprene gaskets to retain solvent in the chamber. Special steel hangers, with bronze bearings for the shafts, are used to support the flights at the front (discharge) end. Discharge doors, opened only when emptying an extractor, are securely sealed against Neoprene gaskets with hand-wheels.

Fitted manholes in the ceiling of each chamber provide easy access for inspection during loading or extraction periods.

Inlet flanges are provided for the 2 in. dia. pipe spray units that discharge solvent over the bran load. This piping circles each extractor at the ceiling and wall joint. Force of hexane spray tends to level off bran charge, permitting uniform distribution of solvent throughout.



OIL-STRIPPING column and reboiler, with evaporator behind. Bran dryer is seen on right.

Recovery From Extracted Bran

Solvent-laden, extracted bran is discharged by screw-conveyors from extractors to the wet-bran surge hopper, from which it is fed by gravity to the dryers (Holo-Flite). These units consist of two sections of steam jacketed, steam heated flights in which bran is heated to 200 deg. F. to vaporize the solvent.

A single-stage steam ejector with after-cooler (Ingersoll-Rand) is used to draw these vapors through the collecting duct system to a scrubber. Any fine particles entrapped in the stream are removed here by direct water spray to prevent fouling of condenser tubes. Scrubbed vapors are then drawn to a 2-pass, surface-type condenser equipped with copper tubes. Condensate joins that from the miscella evaporator and flows to the decanters for water separation and then to the underground solvent storage tanks.

There are four 12-ft.-high decanters (two of 3-ft. dia., two of 5-ft. dia.) operating continuously. Hexane-water mixture enters the center of each unit at a point directly opposite a baffle that is welded along the wall of the tank 6 in. inward and from a point 6 in. from the floor to within 6 in. of the top.

Hexane-Water Separation

The lighter hexane rises and overflows through a pipe located 10 in. from the top of the tank, then goes by gravity to the underground storage tanks.

Water settles to the lower half of the decanter, passes under the baffle, and is forced upward by the weight of the liquid above. It overflows through a pipe located between the center inlet pipe and the hexane over-flow line. Then it passes through the waste water "look-box" and enters a sump, from which it is pumped to the Sacramento River.

Bran is discharged from the dryers to an elevator leading to the extracted-bran storage hopper. Trucks return it to the rice mill, where it is filled in Multiwall paper bags for shipment or storage.

The extracted bran is used in formula feeds, where its increased stability permits inclusion in far greater amounts than that of full fat bran. Further, an increase in protein concentration results. This, of course, is due to removal of the lipid portion of the bran.

On the other hand, removal of these lipids and oil produces a free-flowing material, very light in color and weight, difficult to handle with conventional equipment, and inclined to dust. Lightness increases losses in handling. However, this problem is lessened by addition of as little as 3% feed grade molasses.

An Open-Air Activity

Currently, equipment is being installed to pelletize the low-fat meal. The pellets can be crumbled to whatever degree of fineness required by the feed trade. Tests show that the physical characteristics can be controlled by this method and the product effectively upgraded.

All operations are carried on in an open-type steel struc-

ture to provide maximum ventilation. The building is sprinkler equipped throughout. Adequate overhang is provided for each of the three levels to prevent rain from entering the building. All electrical equipment, motor drives, switches, and lighting fixtures are of vapor-explosion-proof type. Code Type I, Group D.

A separate, totally enclosed, ventilated room houses starter boxes and master switch board on third level of the plant. Steam lines and heating equipment are adequately insulated with either glass wool or asbestos. All tools, shovels, hammers, etc., are of the sparkproof type.

(Turn to page 191)

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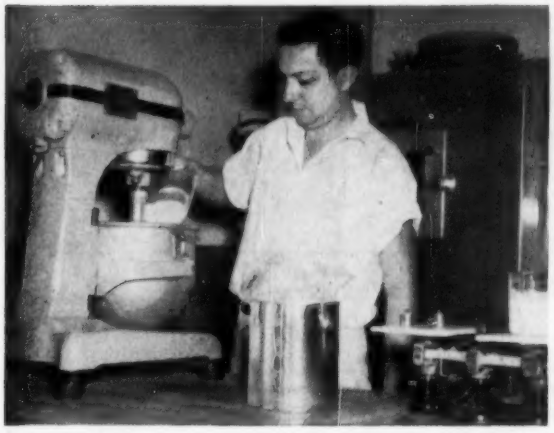

EASY-TO-USE mix is scaled, mixed with water

THEN it is put in freezer and dispensed at 23 F.

Dry Frozen Dessert Mix Solves User Problems

Eliminates over-ordering and spoilage, requires no refrigeration, and saves storage space

To make a low-fat frozen dessert, a freezer operator must purchase his ingredients in the form of a pasteurized, homogenized liquid mix in 10-gal. cans. This he must charge into his freezer, or keep at 40 deg. F. and then use within 12 to 48 hr. Otherwise, spoilage is likely to take place.

Limited storage facilities present a problem to some freezers. So also does the risk of spoilage if too much mix is ordered.

Solution to these problems has been the recent development of dry mixes. In our case, we've come up with a specially formulated one that requires only the addition of water by the user.

Conventional liquid frozen dessert mixes are made up to a 35%-solids' content with 3-4% fat, 15-16% nonfat milk solids, and 16% sugar. Only differences between those and liquid ice cream mixes are that the latter contain more fat and less milk solids. Frozen dessert mixes may consist of butter fat, vegetable fat, or both.

Dry mixes are formulated in liquid form, then pasteurized by suppliers at 165 deg. F. for ½ hr., and homogenized at a pressure of 2,500 psi. After cooling to 40 deg. F., the mix is spray dried to form readily dissolved powder.

Now all the user need do is mix, for example, 6 lb. of the dry powder with 2 gal. of water to come up with 2½ gal. of liquid mix. To this he adds color and flavoring prior to pouring it directly into the freezer. This mix is frozen to 23 deg. F. and to a 30%-over-run in a machine somewhat similar to an ice cream freezer, but which has agitator blades of different size, shape, and settings.

Frozen desserts are dispensed from the freezer for quick consumption. Ice cream, on the other hand, is frozen to a slightly higher temperature (24 deg. F.) and 90-100% over-run, filled into containers that are loaded into a hardening tunnel or cabinet for further freezing (−15 to −20 deg. F.) and then brought up to +5 deg. F. for dispensing.

Key ingredient in our mix is a vegetable protein extractive.* Previously, it was difficult to make a dry mix that, when reconstituted with water and run through a freezer, would whip up properly.

What's more, this protein extractive helps to produce a frozen dessert with a fine, even texture, plus the desired over-run. And it stabilizes both vegetable and butter fats.

The spray-dried mix is packed in polyethylene-lined bags. It remains stable for several months at normal summer temperatures.

Legal Angle

It should be noted that some states require pasteurization of a liquid mix. This would mean that when the powdered mix is reconstituted, it should be pasteurized by the freezer operator, who, unfortunately, does not have the facilities. This appears doubly unnecessary. Conventionally used liquid mixes are only pasteurized, whereas dry mixes are pasteurized (when in original liquid form) and then spray-dried. So the dry mix should have far fewer bacteria per gram than the liquid.

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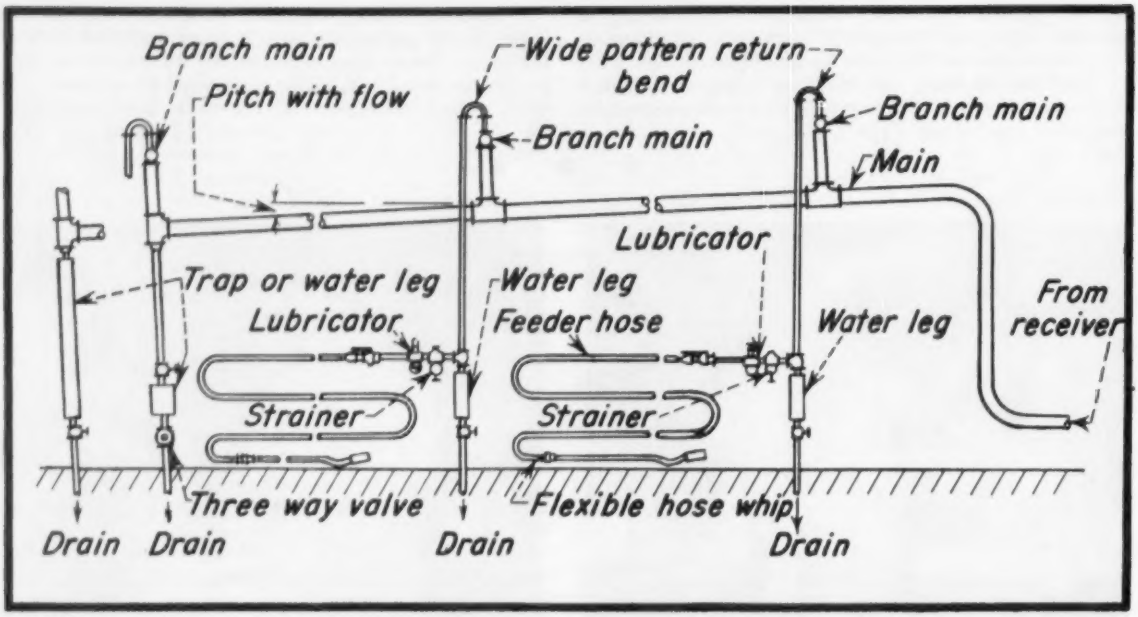
*The work on this vegetable protein was done under contract with the U. S. Dept. of Agriculture and authorized by the Research and Marketing Act. It was supervised by the Northern Utilization Research Branch of Agricultural Research Service.



NUMBER 1 in your examination is to see that you have your compressed air system correctly laid out from receiver, or storage tanks, to condensed water drains at ends of lines. This drawing covers the points.

Compressed Air System Checkup Stops Big $$$ Leaks

Sharp eye on equipment and quick action on repairs are musts. For even small air breaks can sap several hundreds of dollars' worth of power a month. And lowered pressure at point of use hobbles both production rates and worker efficiency.

LEO WALKER
Consulting Engineer, Cheltenham, Gloucester, England

If, in your plant, each tiny air leak in the joints, nozzles, and valves of your compressed air system adds up to ¼ in. dia., and the pressure maintained in the system is 100 psi.—then your leaks probably cost you $500 to $1,000 a month in payments for power alone!

But most of this is waste that can be prevented.

Here are helpful suggestions: If possible, start off by making a survey of your entire compressed air system, preferably when the plant is closed, say over a weekend.

By making note of the pressure-volume drop per unit of time when the system is inoperative, the aggregate loss per day or per month can be calculated and, correspondingly, the monthly or annual cost.

However, the method of ending the waste is the same whether the extent of loss is known or not.

Initially, check to be sure that your hook-up meets all the fundamental requirements of a food plant compressed air system. Here are a few of the factors:

1. Adequate filters should be installed on the intake line supplying the compressors.

These serve a dual purpose. They protect the compressor parts from abrasive action, thus extending its productive life and reducing maintenance. Also, satisfactory air filtration is necessary if the air is to be brought in contact with a food, as in the case in air agitation.

2. If the compressor is a large, heavy, water-cooled type, a sufficient supply of cooling water is needed.

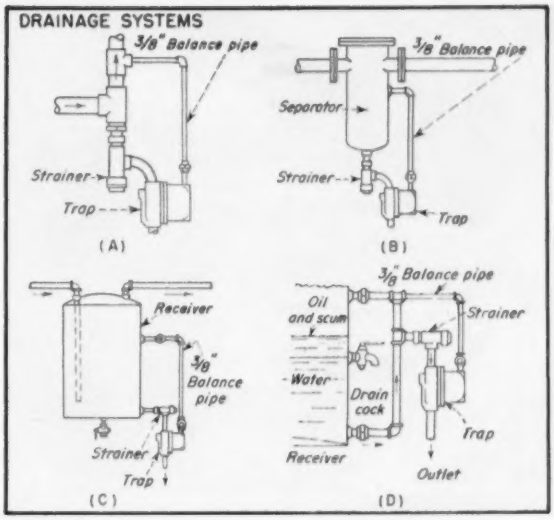
Whereas jacket water discharge temperature for British or European plant use is 90 deg. F., American compressor manufacturers generally suggest that this temperature does not exceed 120 deg. F.

The smaller the differential between intake and discharge temperature, the greater the volume of water required, and correspondingly the higher the water cost.

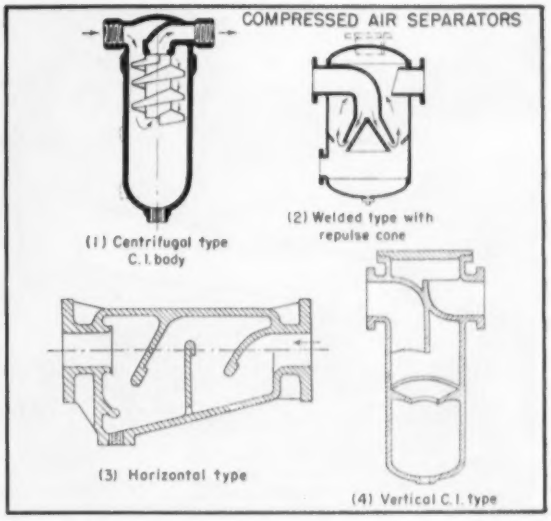
3. Next, equipment should be installed in the line from the compressor to insure thorough cooling of the compressed air before it enters the receiver.

The latter should also be equipped with a drain leading to a trap, or at least there should be a valve for bleeding any accumulation of water. As the air temperature is lowered in the cooling unit (which is generally equipped with baffles for shifting the path of the air back and forth across tubes of cold water), the moisture in the air is condensed, thus facilitating removal, along with any condensed oil vapors.

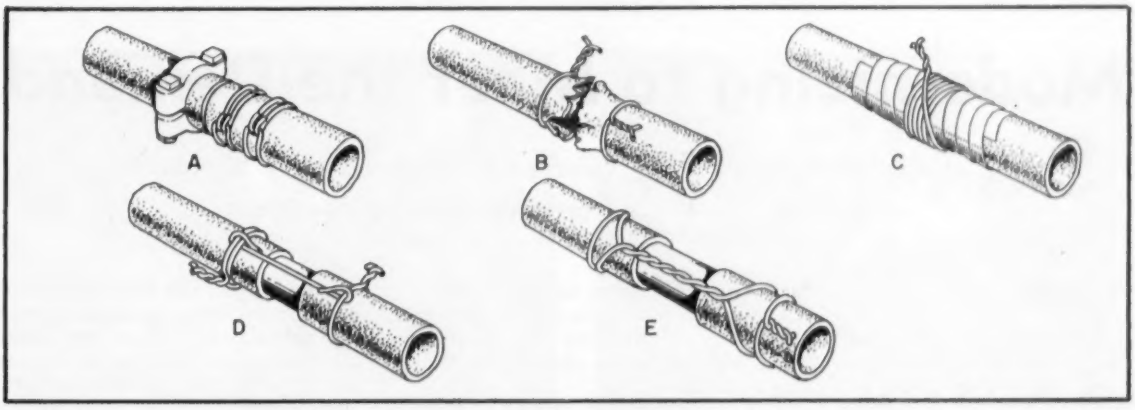
It may be noted that many compressors in American



HOOKUPS for drainage—four general types.


COMPRESSED AIR SEPARATORS
(1) Centrifugal type C. I. body
(2) Welded type with repulse cone
(3) Horizontal type
(4) Vertical C. I. type

FOUR different air-separator designs.



AVOID improper hose connections—for they not only leak expensive air but also invite accidents. Best practice is to use standard connection, as at (A), and shun dangerous makeshifts such as seen at (B), (C), (D), and (E).

food plants are self-lubricated with carbon rings so that the compressed air does not contaminate the foods or blow lubricant anywhere in the plant.

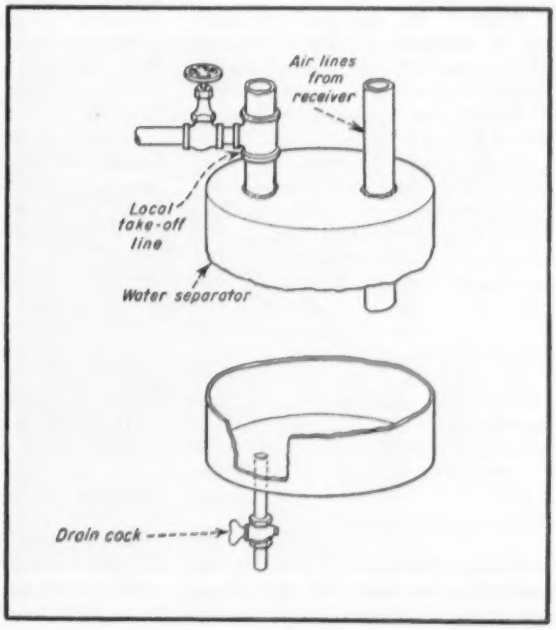
Adequate traps should always be incorporated in original layouts of systems to prevent moisture or oil reaching points of use. In the first trap installation, it's preferable that a self-emptying type is attached to the line immediately following the cooler to prevent, as much as possible, moisture and oil carry-over into the receiver.

As a matter of safety and overall economy, a trap should also be put on the end of, and below, each outlet. Here again self-emptying traps are good insurance. However, on infrequently used lines, or for the sake of economy, an efficient hand-drained trap can be fabricated from 1 to 2 ft. length of 3 to 4 in. pipe closed at both ends. Inlet should extend to within 6 in. of the bottom.

Air outlet is from the top of the trap or from a side near the top. Drain cock or valve is threaded to a nipple from the bottom of the trap. These line-end traps avoid air loss due to frequent blowing to remove moisture.

Inspection of all air lines include not only checking for leaks but also for their causes. Correct alignment is

(Turn to page 191)



LINE-END SEPARATOR collects and removes condensate. It can be made from plant scrap at low cost.

Streamlined Plant That Guaranteed Their —

Modernizing to Meet the Demand

¶ It spurted output . . . ¶ Clinched economies . . . ¶ Simplified sanitation . . . ¶ And bettered working conditions

FE STAFF

Two years ago, Sheboygan Sausage Co., at Sheboygan, Wis., the "Wurst City," found that it had a bad case of "production indigestion"—caused by an imposing demand for its superior products without sufficient facilities to make them.

What it did was promptly reach for a practical remedy—a program of modernizing and augmenting its caught-short facilities. It put up a new $150,000 plant. And it did a thorough job of keying it to the needs.

To hark back, this company started just a little over 20 yr. ago—in the middle of the great depression. In a small, 30x40-ft. wooden building, with only four workers, it turned out quality sausage products. But the amounts were minor, and the operation was not geared to an efficiency that could support expansion.

Up until the start of the modernization, only additions to the outmoded setup were a 20x24-ft. meat cooler and a 20x80-ft. wing for smokehouses and cooking tanks.

Zooming Performance

During building of the new plant, production hummed on without interruption. Outcome has been a zooming performance—hitting 60,000 lb. of sausage products weekly, employing 21 workers. Products are widely distributed in the state by 12 delivery trucks.

Manufactured are various kinds of summer sausage, frankfurters, liver sausage, mettwurst, Polish sausage, bologna, loaf meats, and pork and mortadella sausages.

The handsome new structure is of steel, glass, brick, and stone construction, comprising two floors, plus basement, in a 65x135-ft. area.

Housed in the first floor are three fin-coil ammonia-refrigerated coolers, sausage-making areas, packaging section, sales room, offices, shipping, and employee facilities. Adjoining the entrance is a local customer-service room and packaging department.

Second floor comprises spice room and storage areas for packaging materials and dry ingredients. Plans are underway to construct a 16x34-ft. cooler on this floor for pre-packaging sliced luncheon meats.

Basement has been laid out for a —10 F. freezer (16x34-ft.); a beef-trimming cooler of same size; areas for storing bags of sawdust and barrels of casings; and five ammonia compressors—one a 10-tonner and the rest 3½'s—all time-set for automatic defrosting every 6 hr.

New facilities also have been added to promote better employee comfort and welfare. Included are new glazed-tile showers and lavatories on the first floor. Further, advanced materials handling units have abolished former manual lifting and trundling.

Other job-easers are a hydraulic elevator for moving raw materials from basement to first and second floors, and a carefully laid out overhead monorail system for process-to-process transfer of products.

Good Lighting Accented

Glass blocks frame the window areas on both floors. Window ventilators are employed in the second-floor panels. On the first floor, there is a glass block-fenestration system (light-directing Owens-Illinois glass blocks over the vision-and-ventilation strips).

These blocks were selected to harmonize with the architectural treatment of the new building. While transmitting light, they curb workers' eye-strain, provide insulation, reduce maintenance costs while improving sanitation.

With still another eye on sanitation, President Erwin Steiner had glazed-tile wainscoting put in throughout the building. He also specified ultraviolet

germicidal lamps for all five coolers. Further, stainless steel was called for in equipment and meat trucks.

Operations have been stepped up by straight-through routing of products—from receiving platform, through the many processing stages, to the shipping dock—with minimum manual handlings. Here is the pattern of the raw-to-finished flow:

Fresh beef is received in barrels at the two-truck unloading dock. It is then moved on carriers over a floor-level scale, goes down the elevator and into the basement beef-trimming cooler, then is moved out of the cooler to a stairway to be hoist-raised to the grinder in the sausage make-up room.

Frozen pork trimmings are handled in the same manner, except that they go into the −10-deg.-F. basement freezer. Moreover, some pork trimmings also come in via sloping basement level on 1,600-lb.-capacity truck-carriers.

Meats are then ground at a 7,000-8,000-lb. hourly rate, and next are bucket-charged into either a 400-lb.-capacity silent cutter or a 700-lb.-capacity vacuum-type batch mixer for blending with spices and other ingredients.

Adjacent to grinding and mixing area is a 24x30-ft. cooler maintained at 37-40 deg. F. by an ammonia-coil, blower-type refrigeration system. Here there is temporary storing of fresh meats and other perishables going into sausage-meat manufacture.

Sausage-meat mixes are now loaded into stainless steel truck-carriers (800 to 1,200-lb. capacities) for across-the-floor movement to the stuffing department where, using two units, the meats go into casings.

Products either are trucked to the nearby, specially designed, gas-fired double cookers or are monorailed to eleven single-story smokehouses, all gas-fired from the basement.

Capacities of around-the-clock, 7-day operated smokehouses run from 2,400 to 6,000 lb. Each vat in a double cooker holds 1,000 gal. of water or 500 to 600 lb. of product.

Heating Economies

Cookers and smokehouses are gas-fired, because, says President Steiner, this method is far more economical for his size operations than a boiler system. Where temperature gets up to maximum, the gas flame is simply turned off. Need, therefore, of a man to operate the boilers is eliminated.

The cookers are of stainless steel inside, glazed tile outside, with 6 in. of insulation material between. A ceiling-suspended metal hood confines the steam. And it is pulled out of the building by a 36-in., 1,750-rpm. exhaust fan, thus doesn't deteriorate working conditions.

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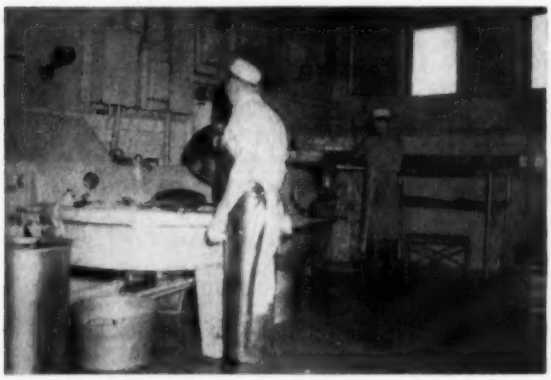
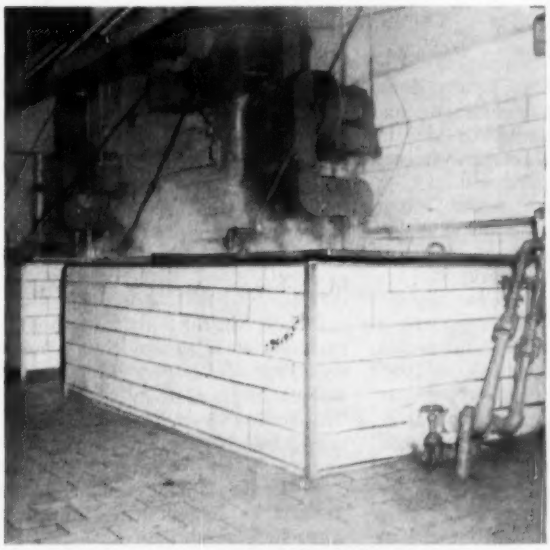
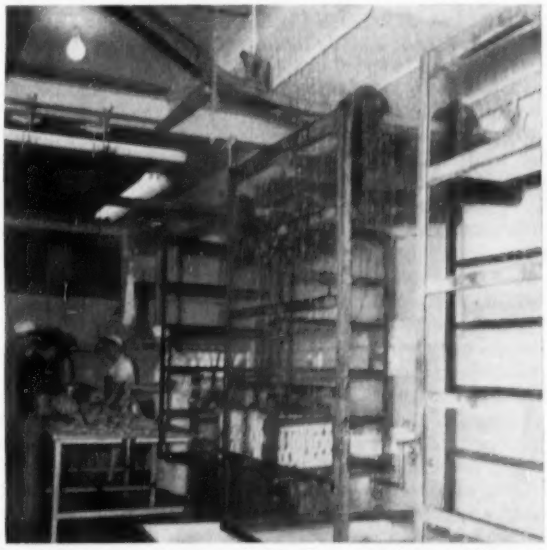


WALLS AND FLOOR in sausage make-up department are of sanitary tile. Utensils and the parts of equipment in contact with products are of stainless steel.

SAUSAGE ROOM also has tile walls and floor, stainless stuffing tables, and sanitary-type glass block windows. Layout makes for optimum performance.

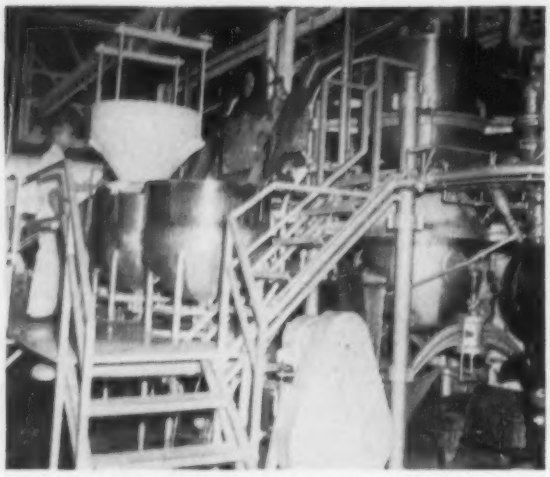


GAS-FIRED cookers are specially designed. Blowers pull flames through tubes in bottom of units.

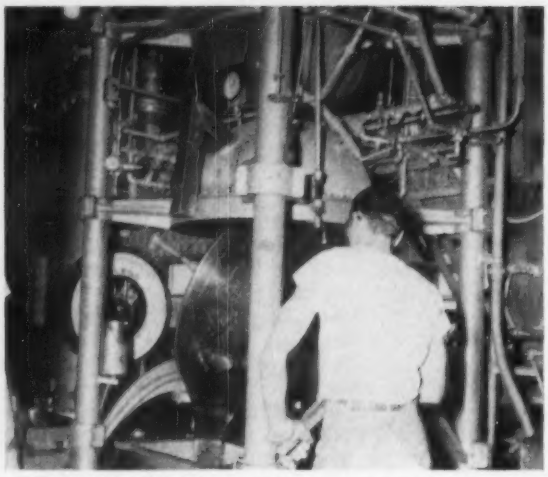


SHOWER was company-built. It comprises ceiling-suspended pan perforated to spray water on hot products.

Semi-Continuous Cooking (Fruit-Flavored Drops)



METERED into pre-melt kettles are water and syrup. Sugar is scaled in from monorail-riding hopper.



PRE-MELT SYRUP for fruit-flavored drops is then pumped into 3-stage cooker (27-28 in. vac. at last stage).

INTEGRATED DUAL LINE

Gives Them Topnotch Performance

Applying practical processing know-how, modernizing equipment and techniques, and adopting advanced controls, F&F Laboratories zooms its output to new heights, clips manufacturing costs—and also insures superior quality of products

WILLIAM SCHLOSSBERG and I. HORNSTEIN
Respectively, Chemist and Plant Engineer, F&F Laboratories, Inc., Chicago

Constantly targeted at F&F Laboratories, Chicago, are three cardinal objectives—turning out hard candies of *superior quality* at *higher speeds* and *lower costs*.

And prime mover in the efforts is the company's continuous modernization program, designed to maintain plant and processing lines at levels of advanced design.

Today, the closely integrated operations consist, basically, of two major candy lines for manufacturing (1) roll packages of fruit-flavored hard candies at a rate of some 400 per minute and (2) cartons of cough drops at about 200 a minute.

Let us observe how efficiency was engineered into the production of superior quality "sweets" on the two production lines:

Sugar is delivered from warehouse floor to cooking kettles by a scaling-feeding system (Baker-Perkins) originally designed for handling flour in bakeries. Equipment comprises a large storage hopper equipped with a series of screw and bucket conveyors for moving sugar to a scale hopper (400-lb. capacity) riding on an overhead monorail in the candy room.

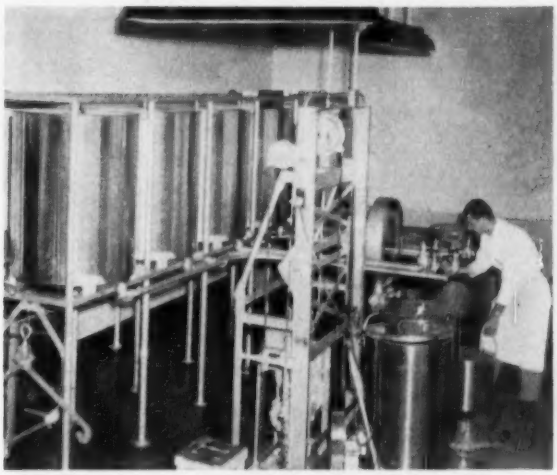
Scale hopper is pre-set for any desired weight, with the sugar stream automatically cut off when pre-set weight has been charged into it. Hopper is then monorailed and its contents charged, by simple lever control, into two 250-gal., stainless steel pre-melt kettles with vertical, propeller-type agitators. When emptied, operator presses a button switch to return hopper to its original position, where it is again automatically filled to a pre-set weight.

Further, the ingredient corn syrup, is pumped from tank cars into large storage tanks. From them, it is pump-metered into pre-melt kettles. Steam coils in the storage tanks keep syrup at a suitable temperature, making it sufficiently fluid for pumping. Thermostatically-controlled steam valves prevent overheating and caramelization of syrup.

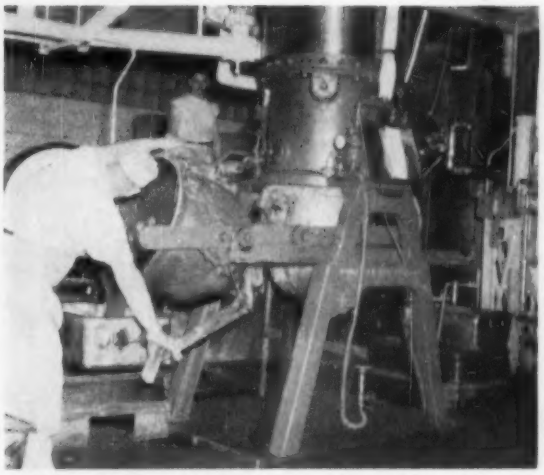
Instrument Control

Process control starts from moment operator, at a control panel, meters water and then syrups into pre-melt kettles. Sugar is then charged from the overhead scale hopper. Dial thermometers, steam gages, and valves, also set in the panel, assure complete control over cooking time and temperature. When desired temperature is reached, a valve on the bottom of the kettle opens to release the pre-melt into a 200-gal., stainless steel surge

Blending and Continuous Cooking (Cough Drops)



SCALED into portable stainless steel, agitator-equipped tanks is medicine ingredient for cough drops.



SYRUP from pre-melt kettles is charged into this continuous cooker in preparation of cough drops.

tank, from which it is pumped into the cooker.

Prior to this point, there is little difference between making the candy base for cough and fruit drops. But the marked contrast in formulas between the two necessitates varying treatments at this stage.

Continuous Cooking

For the cough lozenges base, a continuous cooker is used. Pre-melt is pumped through a series of steam-jacketed coils. Syrup in the coils is subjected not only to heating but also to a vacuum (not less than 27 in.). Result is that the cooked candy (moisture content of 0.5 to 0.8%) is received in a continuous stream at discharge end.

Candy is usually taken off in 90 to 125-lb. batches, depending on the chief cooker's discretion. After weighing each batch, about 10 lb. are removed, with the rest going to a batch mixer (Berks). To the 10-lb. lot there is added sufficient medicine for the entire batch. This is worked in by hand.

As soon as the medicine has been thoroughly dispersed, the small batch is added to the large one on the mixer. Batch mixer consists of a revolving table, equipped with a pair of synchronized claws and plunger.

After 5 to 10 min., the batch is sufficiently mixed and cooled so that it can be handled during subsequent processing.

From this point, treatment of the cough drops varies little from that for fruit drops. So, we'll now swing back to the making of the fruit-candy base.

Because of the high sugar and low corn syrup contents in the fruit-candy base, a different cooking technique is required. Continuous heating and dehydration of the thin syrup film adhering to the coils in the continuous cooker causes crystal nuclei to form, unless a high proportion of corn syrup is used (as in cough drops).

Under favorable conditions, minute traces of crystalline material readily induce complete crystallization in large masses of material in a very short time. The initial semi-fluidity of the raw candy, low moisture, and slow cooling and mixing create almost ideal conditions for nucleated crystallization in the candy mass. Result is that almost all efforts to use a continuous cooker for a high-sugar candy have ended in candy batches that are almost completely crystallized before leaving the cooling slab.

To eliminate this difficulty, hard candy makers have turned to batch or semi-continuous cooking. At F&F, a 3-stage, semi-continuous cooker (Hohberger) has been modified to meet our special needs.

Syrup leaving pre-melt kettles is immediately pumped into an upper kettle (150-gal.), where both steam coils and jackets raise it to 235 F. and the steam pressure is then automatically released. Batch is drawn into the second cooker, heated to 300 F., and then drawn, under 27 in. of vacuum, into the third cooker.

As a check on pre-melt operation, an automatic recorder charts time and temperature of each cook. Also, there is a temperature recorder and controller hooked up to the 2nd-stage cooker of the Hohberger. When the cook is reached at this stage, the thermostatic controller automatically shuts off the steam and a red light flashes as a signal for the operator to pull the batch into the third cooker. This way, supervising personnel can tell at a glance whether or not time schedules are being strictly followed and whether the equipment is performing properly.

Vacuum Cooking

Candy withdrawn into the lower chamber is maintained at a vacuum of not less than 27 in. (preferably 28 in.). Rate at which the operation is carried out is carefully regulated to minimize foaming. Candy is held under vacuum a short period, after which valves are opened and it is then ready for working. A stainless steel periscope aids the attendant in watching the progress of the cook at this stage.

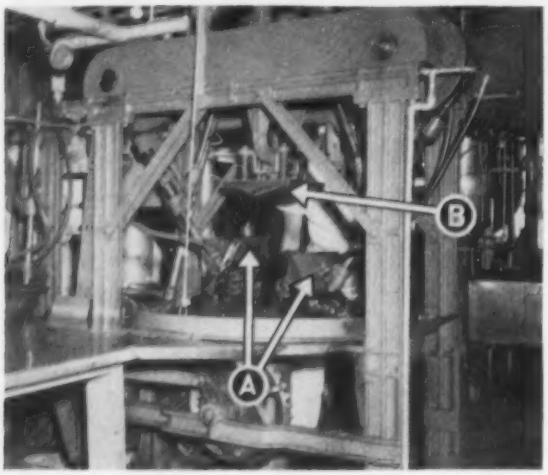
Behind the vacuum cooker is a V-shaped trough used to catch steam condensate trapped in the line. This trough also collects condensate after steaming-out of the tilted kettle.

Timing Essential

Entire cooking process requires careful integration and scheduling of each step. When candy leaves pre-melt kettles, upper chamber of cooker must be emptied and ready to receive it. If the candy stays too long in the intermediate reservoir, cooling may bring sugar crystallization in the pump line.

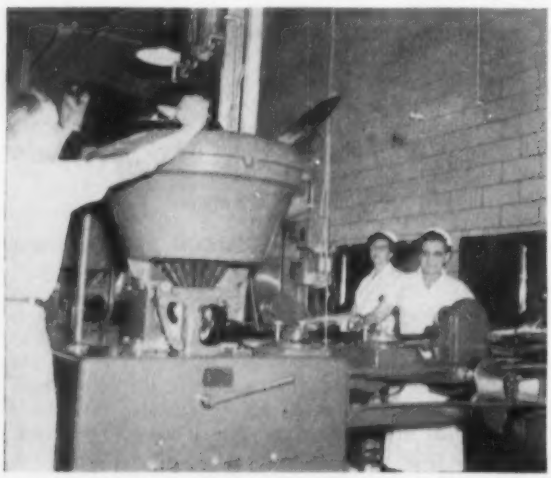
On the other hand, upper chamber of cooker must remain empty for the shortest possible period if steady production is to be maintained. In addition, the empty chamber cools fast and the small residue of partially cooked syrup always presents danger of crystallization.

Mixing, Extruding, Sizing, Cooling, and Sorting

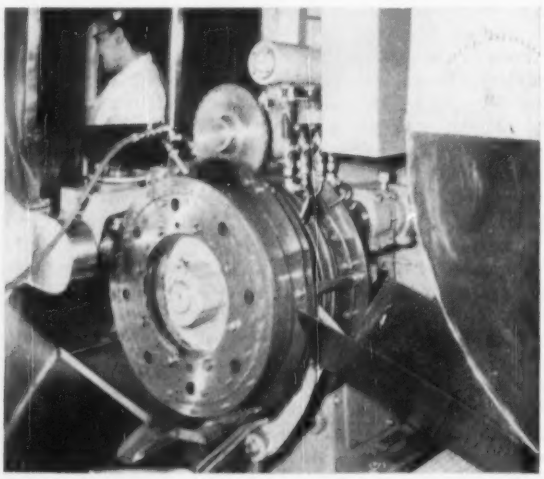


BATCH MIXER, equipped with claws (A) and plunger (B), works flavor or medicine into candy base.

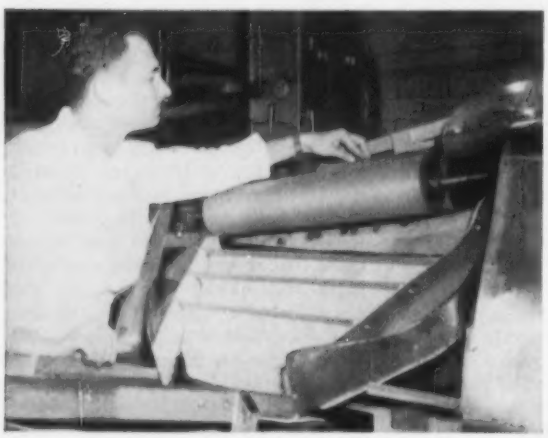
LARGE BATCH of candy is cut in half—for easier subsequent handling—on stainless table with 3-ft. knife.



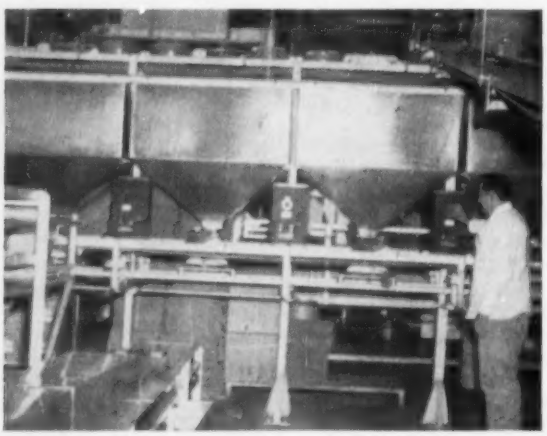
CANDY is next loaded into vertical batch feeder and then extruded into ½-in.-dia. rope.



HIGH-SPEED sizing machine shapes and cuts the candy rope. Rate: 2,800 pieces per minute.



AUTHOR SCHLOSSBERG checks sorter. Unit separates correct-size pieces from the larger rejects.



FLEXIBILITY is achieved by running candies either into hoppers or two lines of packaging machines.

The vacuum chamber must be emptied to receive the newly cooked batch almost instantly, otherwise prolonged contact with the still-hot coils and steam jacket may cause caramelization, resulting in off-taste and discoloration. In short, the process must be almost continuous, with little or no time lag between each successive stage of the cook.

When removed from the vacuum chamber, the candy is weighed into a number of batches of convenient size for subsequent handling. Batches are always of uniform weight—a prerequisite for a method involving scaling of previously prepared amounts of color and flavor. Weighing the candy as it comes from the kettle also provides an additional check on various weighing and metering devices. Thus, the defective operation of any of these instruments will be revealed by the first batch to be withdrawn.

From cooker, the candy (135 lb.) goes to a mixer (Berks), where the color, acid, and flavor are added. After a timed interval on the mixer, the batch is transferred to a water-cooled table, where it is turned and folded until it has congealed sufficiently to permit subsequent handling.

Candy is then cut in half by a blunt, 3-ft. knife attached to the table. Each half-batch is then tossed into a vertical-type, batch feeder (Baker-Perkins). This unit consists of a cone-shaped chamber large enough to hold about a 150-lb. batch. Cone is steam-jacketed and lined with slowly turning rollers. These prevent the candy from cooling too rapidly and losing its consistency. Constantly presenting new surfaces, the rollers prevent the candy from clinging to the feeder walls.

Gravity and take-up rolls at the bottom opening of feeder extrude the candy into a continuous ribbon. A blower at the batch-feeder's discharge prevents the ribbon from sticking to the machine.

Ribbon is then taken up by two sets of horizontal and one pair of vertical sizing rolls that gradually reduce and shape it into a ½-in.-dia. rope. The rope then continues through a small aperture in the candy-room wall to the air-conditioned cooling and packaging room, where it is immediately fed into sizing machines. Each machine cuts and shapes the plastic candy at a rate of 2,800 pieces a minute—about 750 lb. an hour.

From sizing machine, the candy travels by a series of conveyor belts through 6-tier cooling tunnels (each tier 40-ft. long). Then it goes over additional cooling belts, and through sorters that automatically remove outsizes.

Sorter consists of a pair of counter-rotating spiral rolls, set narrow at feed and wide apart at discharge ends. Candy of proper thickness drops between the spirals and onto a belt, while rejects are thrown out at the discharge end of the sorter.

From sorters, candy is picked up by a second series of overhead conveyors. Here, complete flexibility permits diversion of the stream into any one of a number of alternate routes. It may be carried directly to any one of a battery of two types of packaging machines (four of each), or it may be directed into any of the six 1,500-lb.-capacity, stainless steel hoppers.

Assortment Mixing

This flexibility has proved of considerable value where sudden unpredictable shifts of flavor-production schedules are natural occurrences.

Bottom of each hopper is hooked up to a horizontal V-shaped trough with a vibrator (Syntron). Troughs are on opposite sides of the hoppers, and they feed candies, single types or assortments, to cross belts going to packaging machines. One belt feeds four carton-filling machines (U. S. Automatic); the other goes to the same number of roll-packaging units (Redington).

Just ahead of the U. S. machines the candy is fed into 1,500-lb.-capacity hoppers. Candy then drops to a horizontal, rotary feed-table having 19 candy-holding holes. Candies (19 of them) drop into a cup that feeds them into cartons (60 a minute). Tops of cartons are automatically tucked. Cartons then travel over check-weigh units (Selectrol). Finally, cartons are overwrapped, then packed into display boxes and shipping cases.

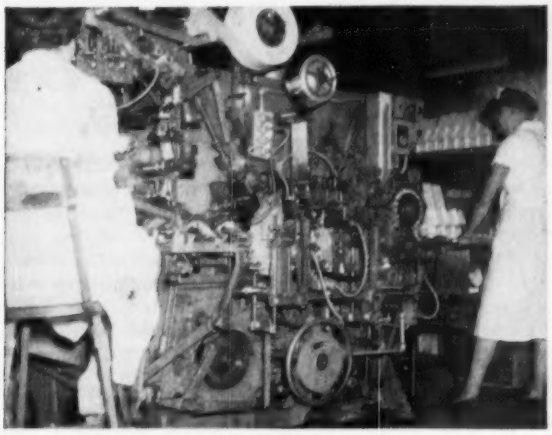
Speed on each Redington machine is 100 roll pacakages per minute. Here, the candy drops from feed hopper into eleven portioned, narrowing, inclined trays to form a roll. The roll is then wax-paper (tear tape) overwrapped, side-tuck sealed, foil-wrapped with a shot of hot wax, finger-tucked, chill-plate sealed, and finally label overwrapped.

Fullest use has been made of finger-tip controlled conveyor belts. Supplies, such as packaging cartons, are loaded on conveyor belts feeding the packaging machines, and the operator has complete control of this supply by means of a pushbutton switch that brings the material forward as it is needed.

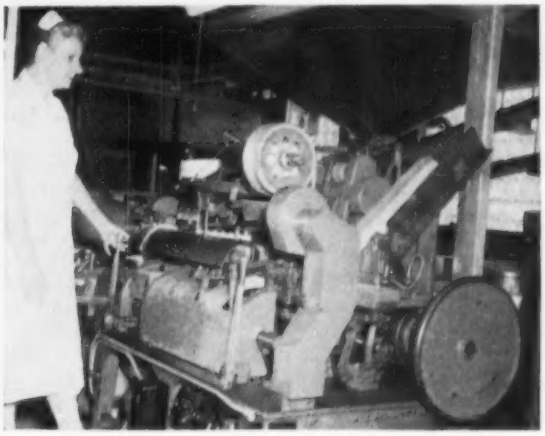
Similarly, packaged goods are moved by another conveyor system having the same type of control. Operator handling the final carton wrapping and corrugated cartoning machines uses this same system to maintain supply and dispose of finished cartons.

(*Turn to page 180*)

Roll Packaging and Cartoning the Drops



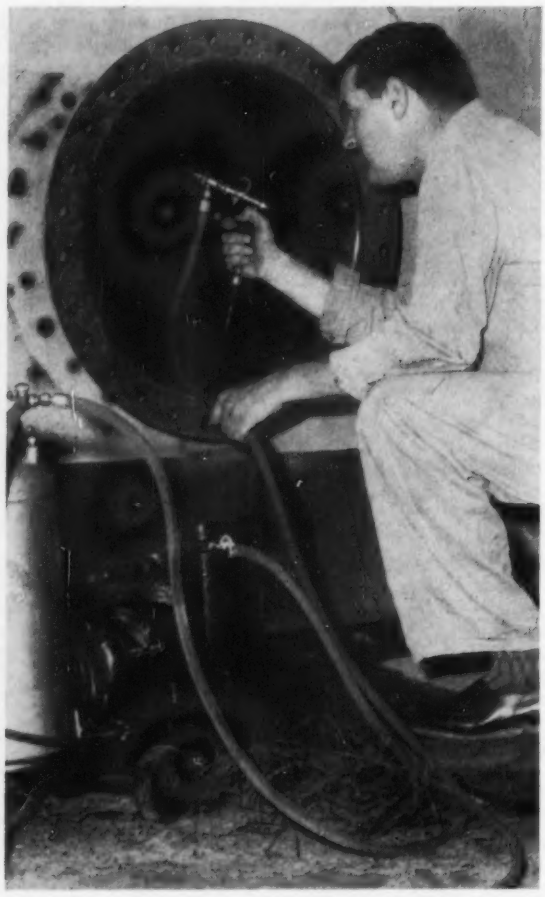
ABOUT 100 roll-type packages of fruit-flavored drops are made each minute by this machine.



THIS UNIT puts precise lots of 19 cough drops into cartons, which come off at 60/min. rate.

Old Hand Way: *Back-Breaking*

FORMERLY, worker had to get inside tank and spray it manually—a distasteful job subject to error.



New Automatic Way: *Self-Working*

TODAY, spray gun is mounted in manhole (as above) and allowed to fog tank for 45 min.—sterilizing all areas.

LET *SPRAY* SANITIZE IT

New fogging technique completely sterilizes tanks—eliminating tough and tedious "crawl inside" cleaning chores

PRESCOTT R. LLOYD

California & Hawaiian Sugar Refining Corp., Ltd., San Francisco, Calif.

Along with the phenomenal growth in use of liquid sugar by fruit canneries, bakeries, confectioneries, beverage and ice cream plants have come special problems concerned with cleaning and sanitizing the tanks used for storage of this product.

Basically these problems are:

A. Complete removal of all traces of the stored product by washing.

Most organic material combines with disinfecting compounds, either reducing their effectiveness as sterilizers or producing objectionable off-flavors.

B. Complete contact of disinfecting solution with all inner tank surfaces that are exposed to the food product in order to kill all microorganisms present on them.

Choice of distinfectant depends on kind of microorganism involved. In case of liquid sugar, these organisms are chiefly genus saccharomyce yeasts and occasional molds. Chlorine and quaternary ammonium compounds are used effectively against these organisms.

Sterilization of storage tanks always has been a time-consuming and very tedious job. Especially objectionable is the manual task of applying a chlorine solution inside a tank during hot weather.

To eliminate this, a method has now been developed for using a fogging nozzle or spray. By merely hanging the nozzle in the tank's side man-

hole, disinfecting fog is diffused over interior surfaces without anyone needing to enter the tank.

Effectiveness of this new method was checked by swabbing marked areas inside a tank with broth culture of viable yeast of known count. The tank was then sterilized and smears taken from the innoculated areas. Complete kills resulted in all instances.

These tests were made on a 25,000-gal. tank at the C & H liquid-sugar tank farm in Los Angeles. The same procedure is being used at our new liquid sugar station in Portland, Ore.

Washing Remains Unchanged

Stepwise, the procedure for washing storage tanks (unchanged with adoption of fogging method of sanitizing) is:

1. Check air filter. Clean and replace filter cloth, if necessary.
2. Empty tank as completely as possible by pumping syrup into empty trailer.
3. Remove ultraviolet lamps and side manhole cover.
4. Remove residual syrup remaining in tank. A portable pump can be used for this operation.
5. Put on rubber suit and overshoes, then connect a hose to hot-water outlet, enter tank, and completely wash down inside. This step requires about 30 min.
6. Inspect walls for defects in lining and for development of black mold growth. This growth can be removed by brushing. Care must be taken, however, that no bristles are allowed to remain in tank.
7. Remove wash water. Special head on portable pump sucks all water from tank floor.
8. Mop floor with chlorinated water, removing any foreign material that accumulates during washing operation.
9. Thoroughly wash the ultraviolet lamps and brackets with chlorinated water.
10. Check these lamps with light meter and replace in lamp well.

Sterilization Is Next Step

Following washing, tank is sanitized by "fogging" employing these five steps.

1. Prepare 3 gal. of 250 ppm. chlorine solution. Place in storage tank of fogging unit. Solution must not exceed 300 ppm. chlorine where tank coating is involved.
2. Adjust nozzle of spraygun so a nearly dry spray (dry to the hand at 2½ ft.) is obtained.
3. Hang spraygun inside manhole. Set trigger-lock, and turn nozzle on. After spraying for 30 min., open roof manhole so tank will vent. This guarantees complete contact of spray to tank roof as well as side walls. Fog will emerge from top manhole if operation is working properly. Continue spraying with roof manhole open for 15 min.
4. After the 45-min. chlorine sterilizing treatment, thoroughly wash inside of side manhole cover and gasket and replace. Tank should be thoroughly dry before closing to prevent peeling of inner lining.
5. Burn lamps for 12 hr. to complete sterilization. Storage tank then will be ready to receive liquid sugar.

A detailed manual, *Care and Handling of Liquid Sugar*, has been prepared by our company. It is available by writing to California & Hawaiian Sugar Refining Corp., Ltd., Industrial Sales Department, 215 Market St., San Francisco 5.

Big Growth Poses Sterilizing Problems

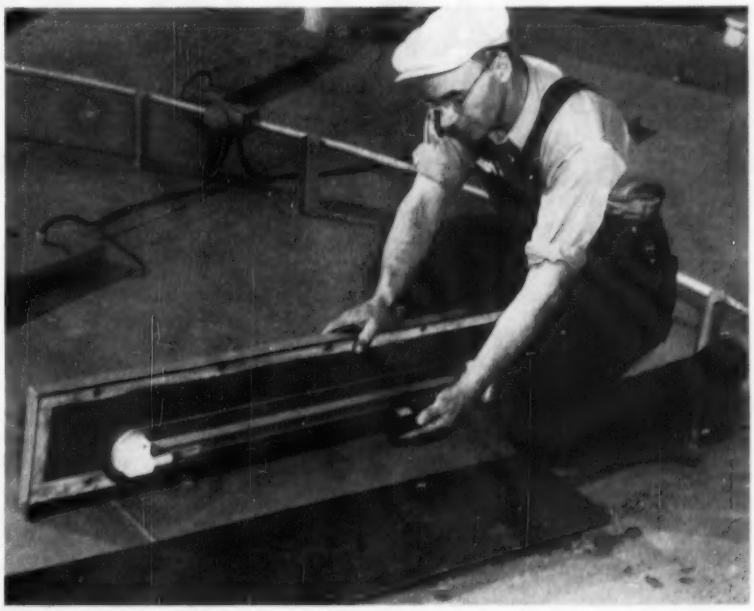
During the past seven years, use of liquid sugar by food processors has grown from mere occasional deliveries by single tank-trucks to substantial present-day hauls by large fleets of trucks and rail tank-cars.

Today, about 90% of all fruit canneries on the Pacific Coast employ liquid sugar in preference to the dry type. And each succeeding year brings in more users from the carbonated beverage, bakery, ice cream, and confectionery fields.

Last year, California & Hawaiian Sugar Refining Corp. alone delivered an amount of liquid sugar equivalent to more than 1½ million bags of dry sugar.

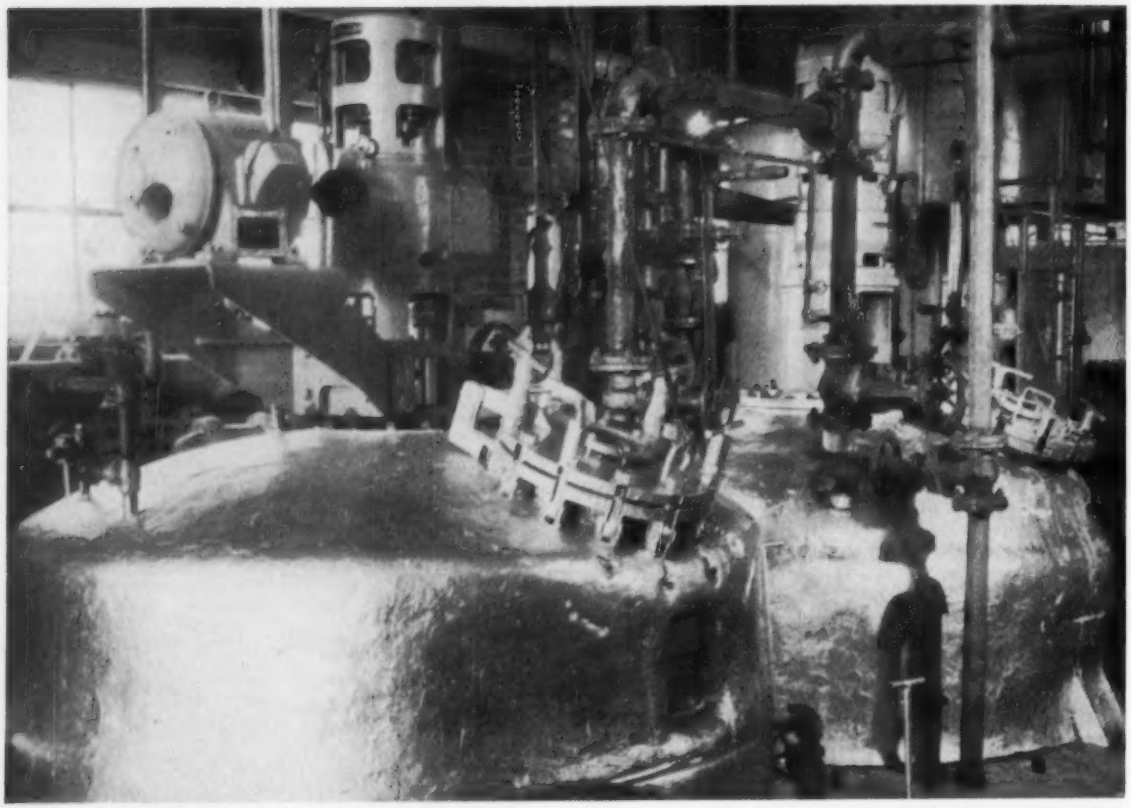
Handling of such large quantities has brought special problems in sanitation, such as cleaning and sterilizing of the storage tanks, which vary in size from modest 5,000-gal. units to 1,000,000-gal. giants used at C & H's Crockett, Calif., refinery. And it is pertinent that spraying (as detailed in the accompanying article) now gives us an advanced technique for accomplishing this task.—*P.R.L.*

PORTABLE PUMP is employed to remove final traces of residual liquid sugar from tank before washing.



STERILIZING LAMPS are removed, thoroughly washed with chlorine, then checked with light meter before being replaced.

Quality Control Is Major Factor in



A LOOK AT PROCESSING STEPS. Pressure kettles, each of 25,000-lb. capacity, are of stainless steel and equipped with stainless turbine-type agitators. Inside, the liquid sugar is constantly stirred during the caramelizing process. Recording thermometers keep a continuous temperature record.

CARAMEL COLOR

★ Its Properties ★ And Its Uses

With these newly revealed points on the much-used but little understood coloring — its chemical nature, types, manufacture, and testing — you will be aided in proper selection and food application of the handy agent

FRED W. PECK
Vice-President, Sethness Products Co., Chicago

Exactly how caramel is formed in the process of burning sugar has puzzled scientists for years. In fact, the reaction is still not completely understood.

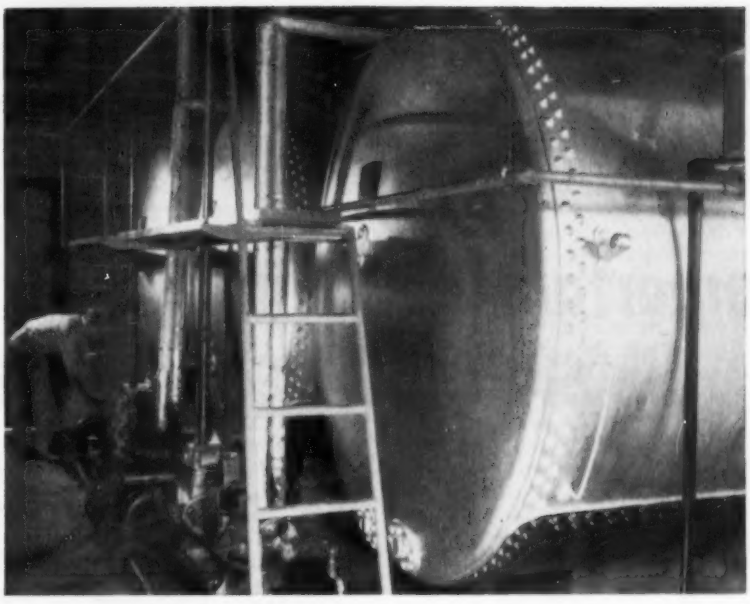
However the baker, the bottler, the confectioner—and many other food processors—can benefit from the scientist's knowledge of caramel's pertinent properties and behavior.

Of immediate interest to the user are the characteristics and applications of the various available grades. Here, these will be pointed up. And mechanisms of the formations will be noted to indicate the many facets of the reactions.

In the case of caramel color, there seems to be a relationship between viscosity and the rate of solubility. Usually, less viscous caramels dissolve faster and have greater color stability, shelf life, and retention of complete solubility. Also, low viscosity caramel is handled with a minimum of waste and effort.

Every manufacturer seeks to reduce

THEN, to insure purity, caramel is run through stainless filter handling 10,000 gal. per 8-hr. day . . .



. . . AND STORED in 10,000-gal. stainless tanks. In this modern plant, emphasis is on stainless equipment to prevent undesirable pickup of such contaminants as iron or other heavy metals.

viscosity. Thus, some caramels have the same solids content and specific gravity as others, but flow more freely and have greater stability. As for standardization on this point, it is considered that a quality acid-proof caramel color should weigh about 11 lb. per gal., and have a Baumé of 35.5-36.5 at 60 F.

Another important property is pH. This varies with the type of caramel but gives an indication of its quality. High pH can indicate an incomplete burn or excessive alkali. Either or both of these conditions mean that the caramel's tinctorial (color) strength will increase as the color ages.

Above a pH of 6.0, the product is susceptible to mold. And at a pH of less than 2.5, it tends to resinify or gel within a short period. This process is accelerated as the pH drops below 2.5. For maximum stability, the pH of acid-proof caramel color, undiluted, should be 2.8-3.3, with an average of 2.9-3.0. Usual method of determining pH is with the glass electrode.

Flavor and aroma of caramel is also a factor. It appears to be made up of two components—a taste due to its acidity and a taste due to its caramel nature. If the caramel is either manufactured or stored in unsuitable equipment, it is apt to carry a metallic taste due to pickup of excessive amounts of iron or other metals. Use of stainless steel equipment entirely eliminates this possibility.

Degree of taste due to acidity depends on the particular type of caramel being considered. Whereas this taste can be modified, the caramel flavor or taste is natural to the product and is unalterable.

However, such modification is seldom necessary because the quantity of caramel used to color a given product is usually so small that it adds no flavor to the finished product. This can also be said for caramels processed in pressure kettles. But one of the characteristics of pressure-kettle colors is a somewhat stronger taste and aroma than those found in caramels processed in open kettles.

Beverage Use

Caramel molecules in an aqueous solution are colloidal. They carry small electrical charges which may be either positive or negative depending on the method and catalysts used in manufacture. Flavoring essences used in most food products, including soft drinks, also contain colloidal material, such as tannin. These particles are negatively charged when in slightly acid products.

Occasionally refined sugar and purified water will also contain small quantities of negatively charged colloidal materials. Thus, if we introduce caramel molecules with positive charges, mutual attraction between oppositely charged molecules causes them to combine and form large electrically neutral particles. These are insoluble, so turbidity or flocculation takes place in the beverage.

Caramel in aqueous solutions, as in soft drinks, must be chemically tailored to be compatible with other ingredients. The chemist's yardstick for this tailoring is the isoelectric point or the pH at which the colloidal charge is electrically neutral.

Summarizes Latest Theories

Caramel is found to a greater or lesser extent whenever proteins and sugars are cooked together, or when sugars are heated alone.

But so many simultaneous reactions are possible that no one positively can state what chemical reactions actually occur and what the end-products will be.

Generally, it is believed that formation of caramel from dextrose is a type of polymerization. Original dextrose units are built into larger dextrin-like molecules, some containing 36 carbon atoms and others 96 or more. There is loss of water on polymerization.

What direct relationship exists between these complex groups and the intensity of caramel color is not clear. But this article summarizes the latest theories.—*F.W.P.*

Important news in SOLUBLE COFFEE!

This new soluble coffee system gives you everything you need to blend your own!

Now you can get *your* share of the sky-rocketing sales in the "instant" coffee business!

Although it comes to you as a "packaged process," this Pfaudler system can easily be controlled to produce the flavor you want—maintaining the desirable flavor characteristics of your present brand of roasted coffee.

Right from the raw bean down through the steps of cleaning, roasting, extracting, drying and packaging, this new Pfaudler process gives you fingertip control. The extraction and drying of the roasted bean to produce soluble coffee is continuously regulated to produce a good, uniform product.

You can rely on the results because this process has been engineered by The Pfaudler Co.—we've been serving the food industries for 70 years. Pfaudler high-speed filling machines, percolators, processing vats, storage tanks and other food processing equipment are helping hundreds of food processors increase production and get a higher quality product. Pfaudler's standard designs and easy-to-clean alloy or glassed steel construction make this possible.

Get into the profitable soluble coffee business. You don't have to work out your own process, or track down equipment for it. Pfaudler will design, procure and fabricate everything you need. A complete plant layout will be furnished. If you desire, we can also handle erection and furnish start-up service. Write for the full story on soluble coffee.

THE PFAUDLER CO. **ROCHESTER 3, N. Y.**

At pH's above this point, caramel is negatively charged in solution. Below this pH it is positively charged. Therefore, soft drinks need a caramel whose isoelectric point is below the pH of the beverage. Good beverage caramel must carry a strong negative charge and its isoelectric point should be at a pH of 2.0 or less to allow the user a sufficient margin of safety.

Spirit caramel, used in whiskey, brandy, and cordials, should instantly dissolve in a 60% solution of alcohol and water by volume and give a sparkling brilliant solution. On the spectrophotometer, spirit caramel must have the proper balance of coloring tones to duplicate the color of aged whiskey.

This type should have an isoelectric point below a pH of 1.5, preferably 1.0, to keep it from precipitating any negative colloidal material such as tannin and vegetable extract. It must also have an extremely low iron content (a maximum of 25 ppm. is desirable) and be free of all traces of heavy metals.

There is still some market for beer color although not nearly as much as there was 20 yr. ago. The American public now favors a pale, dry beer. In England, however, breweries are probably the largest consumers of caramel. But here the methods of brewing differ entirely from those followed in this country and on the Continent.

Our brewmasters are principally of German descent and use that system. The British are addicted to employment of various sugars in the manufacture of their beer. In their processing they add large quantities of caramel color.

Beer caramel is somewhat weaker in tinctorial strength than most other caramels. It has a higher pH than acid-proof caramel, 4.4 to 4.5. Caramels which give higher or lower pH when added to the fermenting wort can alter the pH sufficiently to change the flavor of the resulting beer.

They must be compatible with hops and all other materials used in brewing, carry a positive charge, and be able to withstand the fermentation process. Most important, they must be absolutely chill-proof and not cause a haze in the beer.

Baker's Types

In the modern bakery there is an ever present need for caramel color. The product principally maintains a uniform shade of coloring in baked goods. For flavoring reasons, a baker might want to use light colored cocoa or light rye flour. But his trade may be partial to dark colored goods. In this case, the caramel darkens his goods and pleases the consumer's eye as well as his palate.

Caramel is also extensively used by cookie and cracker bakers. In fact, it is employed in practically every instance when the manufacturer wishes to darken his baked products. There are many grades of baker's caramel coloring. Some are manufactured to sell at a very low price, while others are made for the more discriminating buyers. Obviously, cheap grades are not too carefully processed or refined.

Some are not clear and brilliant in solution, since they are not filtered or centrifuged as are the better grades. Many of the cheaper grades are not standardized for coloring power. Here, the baker must experiment with each new lot.

Although all baker's caramels appear to be heavy black syrups, nothing about their appearance is indicative of strength or quality. However, characteristics of a good baker's caramel are known. It weighs approximately 11 lb. per gal., is free flowing, and is low in viscosity.

This free-flow quality is very important, especially with baker's caramel. It facilitates solution in water or dispersion in dough, which is essential for uniformity of shade in the finished goods.

A water solution of a quality baker's caramel should be clear and have the natural caramel shade. It should have a pH of approximately 4.0 to 4.2 (near the normal fermentation pH) and a high tinctorial strength.

Caramel plays a role in the manufacture of soups, gravies, gravy flavor, sauces, and condiments. In each case it must be tailored to suit these products. This also applies to caramel for prepared cake mixes, canned meat products, flavoring extract, household extracts, coffee products, bouillon cubes, dog food, and many other food items.

EXPERIMENTAL pressure kettle is used in laboratory to solve special customer problems, improve existing products, and to pioneer new caramels.

Testing for Color

Although cost of caramel in a finished product is small, amount of coloring per gallon may vary. This tinctorial strength is of prime importance to the user. A few cents more per gallon may buy considerably more coloring strength. However, it is not an easy matter for the average user to accurately determine color strength.

He has three alternatives: (1) Buy the equipment to make the tests; (2) send the sample out to a chemical laboratory; or (3) take the word of a reliable manufacturer.

There are two commonly used systems for testing coloring power—the Lovibond and the Klett. Both are reliable, but opposed terminology is confusing to those unfamiliar with the methods. The two systems have one thing in common, however: They both use glass colored standards to which a solution of caramel is matched.

The Klett system employs a standard glass slide. A 1% solution of caramel is placed in a cell and matched against the known standard of the glass slide. The Klett cup, containing the unknown solutions, is raised or lowered to present a longer or shorter path of light through the solution from the light source.

Length of the light path is adjusted by raising or lowering the Klett cup in order to balance the color of the unknown with the color of the standard glass. It is transmitted and measured on a drum and termed the Klett reading.

The smaller the depth or light path, the greater the strength of the caramel. In other words, as the Klett numbers decrease, the greater the strength of the caramel.

This is directly opposite to the Lovibond method, where the greater the recorded number the stronger is the caramel.

An interesting sidelight on caramel color is that color-spectrum analysis shows its composition to be about 70% red, 25% yellow, and 5% blue. But if certified colors are used in an attempt to duplicate the color of caramel, it requires 60% yellow, 35% red, and 5% blue. This apparent discrepancy seems to indicate that "certified red" is more intense than "caramel red." Therefore more yellow is needed to tone down the intensity of the red to make a synthetic color matching true caramel.

On a spectrophotometer, the best wavelength for caramel color measurement is approximately 560 millimi-

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crons. At this wavelength the best correlation and reproducibility is found, even though by calculating percentages and wavelengths the measurement should be at approximately 650 millimicrons.

This merely indicates once more that caramel color is a chemical oddity. It is not a true solution and does not follow Beer's Law.* Thus, the variation between actual and theoretical wavelengths.

3 Other Tests

Further tests are carried out as follows:

1. *Isoelectric Point*—Dissolve 0.25g. of plain (unflavored) gelatin in 500 cc. of distilled water. Pour 100 cc. into each of four separate beakers and adjust pH of each beaker to 1.0, 1.5, 2.0, and 2.5, respectively, with hydrochloric acid.

Then dissolve 2.5g. of the caramel to be tested in 500 cc. of distilled water. Pour 100 cc. into each of four beakers and adjust pH of each to 1.0, 1.5, 2.0, and 2.5, as above.

Fill four test tubes about ¾ full from each of the marked beakers containing caramel solution. Add several drops of gelatin solution of the same pH as the caramel test solution, and observe immediately against a strong light. Look for a haze at the interface of the gelatin and caramel solutions. Repeat this procedure with other caramel solutions, always matching pH values of the test solutions. Let test tubes stand for 12 hr. and repeat observations.

This test is based on the known isoelectric point of gelatin, which is 4.7. At lower pHs, gelatin is a positive colloid and will be precipitated by the negative caramel, or remain clear if the caramel is also positively charged. By bracketing the isoelectric range, it is possible to establish that a caramel is not above a certain value. A haze at this pH with gelatin insures that it is below this figure.

Gelatin solutions should be made fresh each 24 hr., since they decompose on standing.

2. *Colloid Character*—Prepare 1.0% U.S.P. tannic acid solution and filter until clear. Make up 1.0% caramel solution in distilled water. To 13 cc. of caramel solution add 12 cc. of tannic acid solution. Mix well. Mixture should remain clear for 24 hr.

3. *Acid Resistance*—Make 1.0% caramel solution with distilled water. Dilute 50 cc. of this solution to 250 cc. and add 7.0 cc. of concentrated hydrochloric acid. Boil for 5 min. Cool to room temperature and observe for cloudiness in ordinary light. Repeat after 24 and 48 hr. Solution should remain brilliant and clear through 48 hr.

* Equation relating light transmittance (at given wavelengths) to concentrations and depths of solutions.

How Made

Now that properties and uses have been described, how are the various caramels made?

Today's plant consists entirely of stainless steel equipment—kettles, lines, storage tanks, filters, etc. Recording thermocouples automatically print a temperature record of each batch as it is processed. In fact, little is left to the human element, and complete laboratory control assures consistent uniformity.

High quality caramel is manufactured from corn sugar, known as Brewer's White #70 or #80. They are so designated because they contain approximately 70 or 80% reducing sugars calculated as dextrose. Or a special liquid sugar with about 85% reducing sugars may be used. Sugar is charged into scrupulously clean autoclaves or kettles. Two types of kettles are employed, depending on type of caramel to be processed.

One type, known as an "open kettle," ranges in size from 8,000-10,000 lb. capacity. The other is a "pressure kettle" which can hold 25,000 lb. of sugar. All kettles are equipped with large stainless steel rotary or turbine-type agitators, since it is necessary to "stir" the sugar constantly during the process.

Sugar is then heated in the presence of reactants and catalysts. During this process the temperature is held at over 250 F. for several hours. When the proper color is reached, contents of the kettle are quickly cooled to about 200 F., and put through a filter that has a capacity of 10,000 gal. per 8-hr. day.

Carmelizing of sugar is of course the very heart of the process. It is during this process that we encounter the term "straining the caramel". This implies too long a period of heating or too high a temperature used in an effort to produce a higher coloring strength. In either case the caramel is said to be "strained".

Storage

When this occurs, certain of the caramel's desirable properties are lost. Depending on extent of the straining it may lose a small or large degree of its usual stability. Overburning also results in a caramel with excessive viscosity. Apparently, there is a definite maximum of coloring strength which can be obtained in a given caramel, according to the combination of catalysts and time used.

After filtration, caramel is stored in large tanks or packaged in plastic-lined drums or barrels. Occasionally, it is run directly into tank cars for shipment to larger users.

Carmelization is believed to continue after processing, although at a very slow rate. For that reason, the user should store the caramel at cool temperature. Such storage does not affect a quality caramel, which may stand over a year without thickening. In fact, some grades will keep for as long as five years. In any event, the user should select his source carefully if he contemplates carrying a large inventory.

Storage of caramel in the case of bulk users presents a different problem. They must have facilities large enough to accommodate 90,000-lb. deliveries. And these should be constructed of stainless steel to eliminate metallic contamination.

Suitable railroad sidings are necessary, and adequate steam lines must be available to heat the coils of the tank car during cold weather. This facilitates removal. But extreme care must be taken not to burn the caramel while doing it. For this, steam at 10 psi. maximum should be used to warm the caramel gradually over a period of hours.

On prolonged storage, however, caramel resinifies into an amorphous, irreversible gel which is not usable.

More knowledge of this gelling may lead to a better understanding of the caramelization reaction, since the gel stage seems to be its end result. But the following paragraphs reveal what is known.

Reaction Mechanisms

Considerable research has been conducted on "browning reactions," into which category caramel formation falls. Caramelization is one or a combination of three broad types of browning**:

1. Maillard reaction – comprising carbonyl-amino reactions of aldehydes, ketones, and reducing sugars with amines, amino acids, peptides, or proteins.

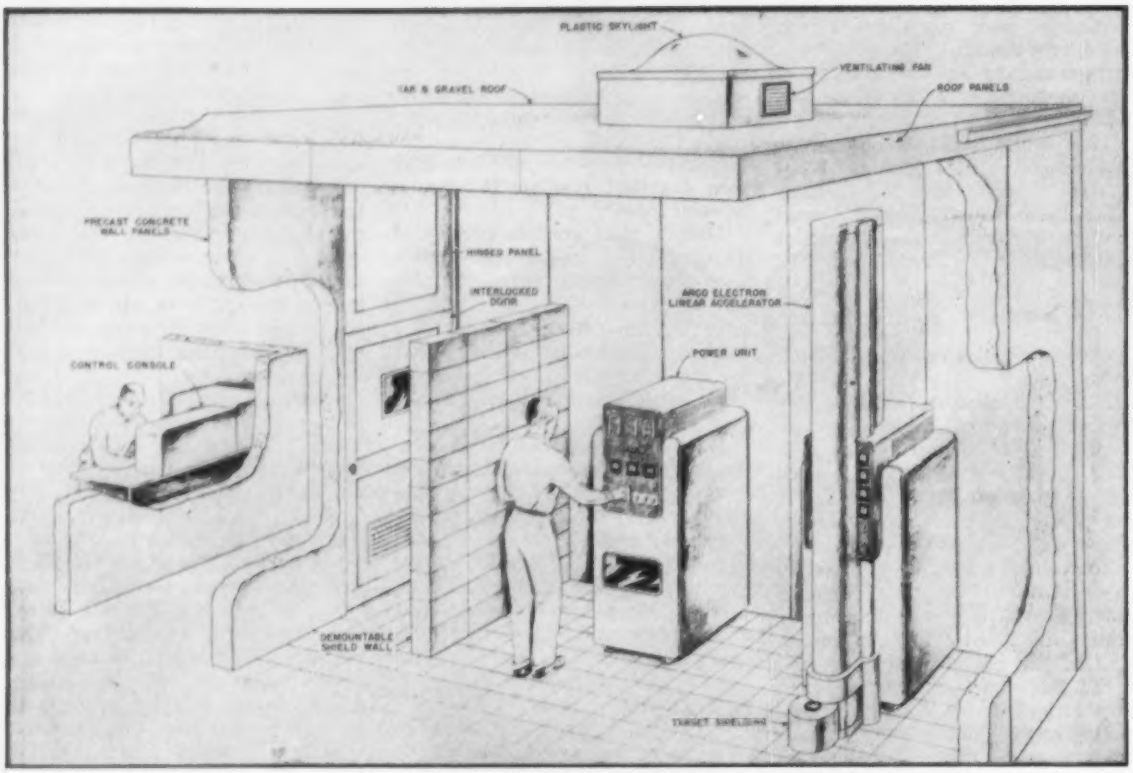
2. True caramelization–due to heat alone. Occurs when polyhydroxy carboxylic compounds, such as sugars and polyhydroxy carboxylic acids, are heated to relatively high temperatures in the absence of amino compounds.

3. Oxidative reactions–on food constituents, which may or may not be enzyme catalized.

Some workers believe that reactions (1) and (2) do not require the

(*Turn to page 154*)

** Hodge, John E., "Dehydrated Foods, Chemistry of Browning Reactions in Model Systems." *Agricultural & Food Chemistry*, Oct. 14, 1953, p. 928.



EXPERIMENTAL irradiation setup. Room is built with pre-fab concrete panels. Shielded target turntable reduces room shielding, expedites operation. Later, unit will be used in combination with conveyor for processing.

Radiation Costs Calculated In Pilot-Plant Program

Figure put at $1.06 a ton for pasteurizing pre-cut meats at high volume. Complete sterilization would cost 2c. a pound

MORRIS R. JEPPSON
Physicist, Applied Radiation Corp., Walnut Creek, Calif.

Pre-cut meats in packages up to 0.7 in. thick can be pasteurized by electron radiation at a calculated cost of $1.06 a ton. Complete sterilization can be achieved for 2c. a pound. Pasteurizing in carton quantities by converting the electron beam to X-rays increases the expense to about ¼c. a pound.

These costs have been calculated to help food processors evaluate the application of electronically produced radiation. Very little information of this type has heretofore been available. The calculations are based on dosage data reported in the literature and on research studies in the development of a radiation pilot plant by Applied Radiation Corp.

A-Bombs in Background

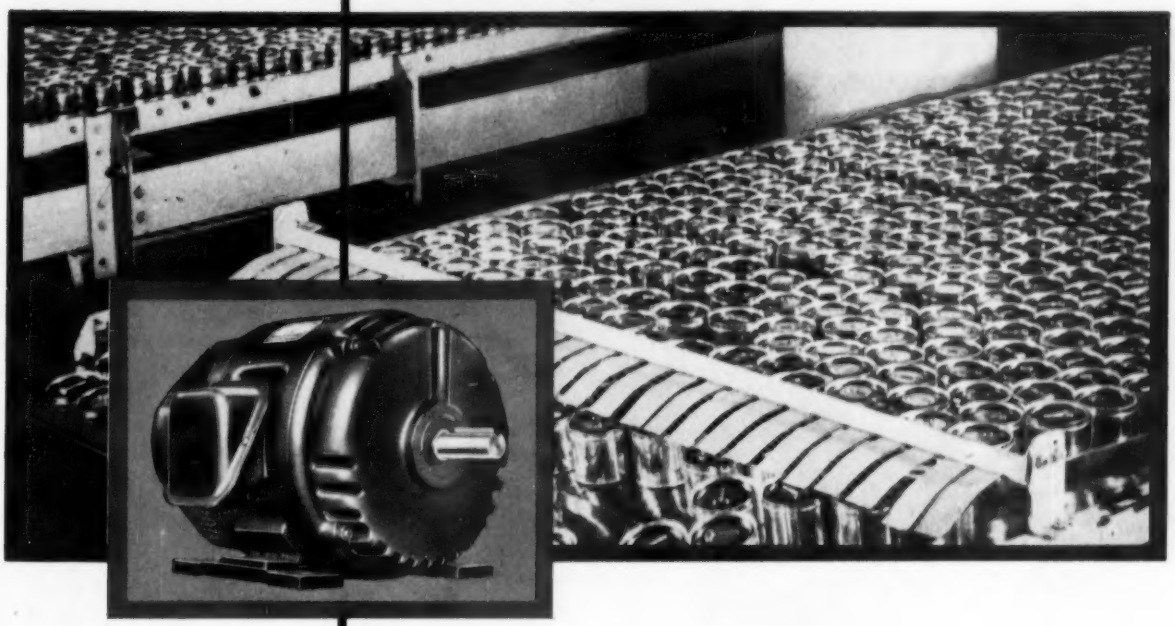
Pioneered by the late Prof. W. W. Hansen at Stanford University, a traveling-wave linear accelerator showed high promise as a source of intense radiation.

Accordingly, a group of electronics specialists with skill in accelerator design and engineering organized Applied Radiation Corp. (ARCO) to develop this accelerator for large-scale processing.

Among these specialists was the author, Morris R. Jeppson. A physicist trained in electronics and radar as an Air Force officer, he participated in field testing and combat application of atomic bombs.

Later, as a graduate student, Mr. Jeppson worked at the University of California Radiation Laboratory on the construction and operation of the 4-million-volt Van de Graaf and the 32-million-volt proton linear accelerator. Then he studied the effects of radiation on materials.—*The Editors*

End spoilage due to motor breakdown



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Utilization efficiency is estimated from data on ionization as a function of depth of penetration for cathode rays.[1] If package thickness is limited to 0.7 in., the uniformity of irradiation with depth (using a single beam system) is about ±25% of the average dosage. Some electron energy is wasted, and the center of the product will receive 100% more than the minimum dosage of 50,000 rep. (Roentgen equivalent physical). With an overall utilization efficiency of 50%, the 4-kw. electron beam will process 38,000 lb. of meat per hour.

On a two-shift 5-day operating basis (assuming 280 actual processing hours a month) 5,200 tons of meat can be pasteurized per month.

Cost for Sterilization

A radiation dosage of 2,000,000 rep. is needed for complete sterilization. A utilization efficiency of 50% will again give a 100% overdose at the center of the product. At a 4-kw. power level, the electron beam will sterilize 950 lb. per hour, or 266,000 lb. per month for a two-shift operation. The cost for radiation sterilization is accordingly 2c. a pound.

Processing With X-Rays

If the electron beam is stopped by a metal target placed between the accelerator and the conveyor, a very intense X-ray beam is produced. The efficiency of energy conversion increases as the electron beam energy is increased, 10% being converted at 2 million volts and 30% at 6 million volts.

The conversion X-rays produced by the accelerator are for the most part still directed toward the conveyor. However, X-rays do not have a well defined depth of penetration, as does the electron beam. For example, a 3-million volt X-ray beam is reduced to half of its original intensity after passing through 6 in. of meat, and to one-fourth of the intensity at 12 in.

Lack of a definite penetration depth, the conversion factor, and the excessive scattering of the X-ray beam reduce the utilization efficiency to about 10 to 15%.

But in spite of the higher cost of pasteurizing with X-rays, there is an advantage in having a useful penetration of 6 to 12 in. of meat. And an installation could be designed to permit processing with either the electron beam or the X-ray beam.

Where Radiation Stands

Complete sterilization is the ultimate aim in processing foods with radiation. However, research to date has shown that a sterilizing dosage of radiation imparts objectionable flavors, odors, and discoloration to most foods.[2] Practical applications for radiation sterilization must await the development of techniques for minimizing or eliminating these undesirable effects.

In the meantime, investigations at the American Meat Institute Foundation[3] have shown that a relatively small dosage (50,000 rep.) of radiation will pasteurize meat products, thereby increasing the shelf life under normal refrigeration by five-fold. Little, if any, loss of desirable properties was found at this dosage level.

The AMI report concluded that a combination of mild heat (to inactivate enzymes) and radiation might prove to be the best processing method.

Radiation pasteurizing will bring the food industry much nearer the practical application of radiation than has been thought possible to date. It does not seem unreasonable to conclude that irradiated meat products will be on the market by the summer of 1956. Pilot-plant installations should be in the planning stage now.

ARCO has designed and constructed a pilot installation utilizing a traveling-wave linear accelerator. Capable of delivering 2 to 4 kw. of electron beam power, the pilot plant can be built to permit food processors to experiment with any of the three following processes:

1. Pasteurizing with a 6 million volt electron beam.

2. Sterilizing with a 6 million volt electron beam.

3. Pasteurizing with X-rays produced by inserting a metal target into the electron beam.

An installation of this type could be used, for example, by large meat packers or by food chains interested in centralizing meat cutting and packaging operations.

When pasteurizing with electrons, the production capacity may be much higher than necessary. However, the flexibility in being able to switch to X-rays in order to obtain the depth

(Turn to page 164)

ANALYSIS OF CAPITAL AND OPERATING COSTS

Capital Equipment Costs		
Electron linear accelerator (delivered and installed)		$117,000
Shielded accelerator room—10x12x14 ft. with 8-in. concrete walls—includes wiring, plumbing, and special conveying equipment		11,600
Total		$128,600
Monthly Operating Costs (Estimated for two shifts, 5 days a week)		
Salaries:		
Engineer-physicist	$650	
Technicians (two)	1,040	
Electric power @ 3¢ per kw.-hr.	355	
Maintenance—repair and upkeep of accelerator and associated equipment	550	
Total	$2,595	$2,595
Indirect Costs (at 30%)		780
Overhead		
Payroll	$240	
Administrative	280	
Total	$520	520
Depreciation (70% in first 5 yr. to include obsolescence)		1,500
Insurance (0.1% per month)		115
Total		$5,510

Cost for radiation pasteurization is then $1.06 a ton. It should be noted that a 5,200-ton output per month may be unrealistically high, even for a large packing house.

Unit Costs for Pasteurizing at Various Production Rates

Plant Output (tons per month)	Shifts per day	Cost per Ton	Cost per Pound
5,200	2	$1.06	0.5 mil
2,000	1	2.75	1.4 mils
1,000	1	5.51	2.8 mils
400	1	13.80	6.9 mils

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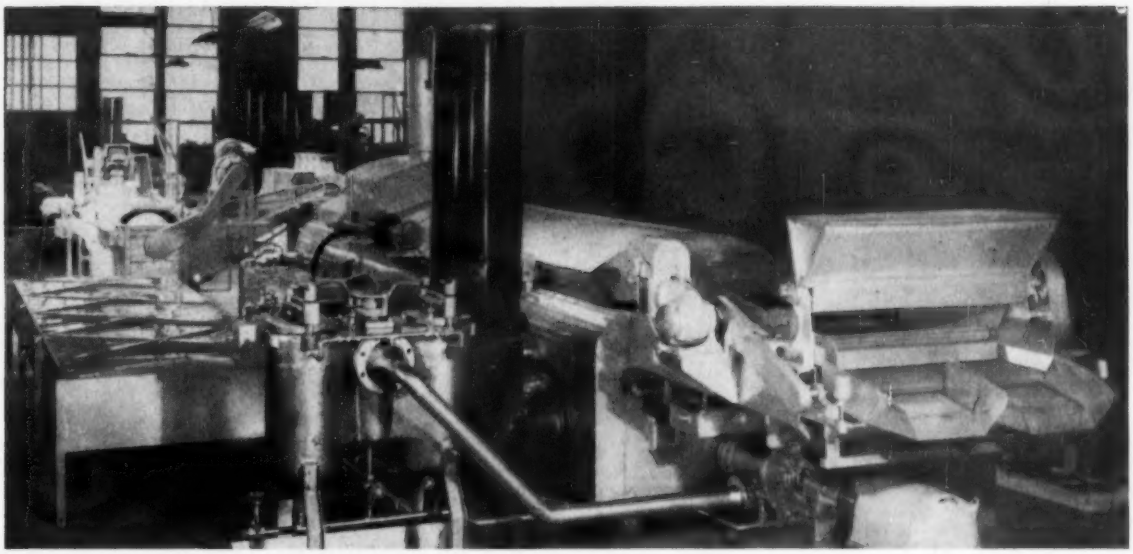
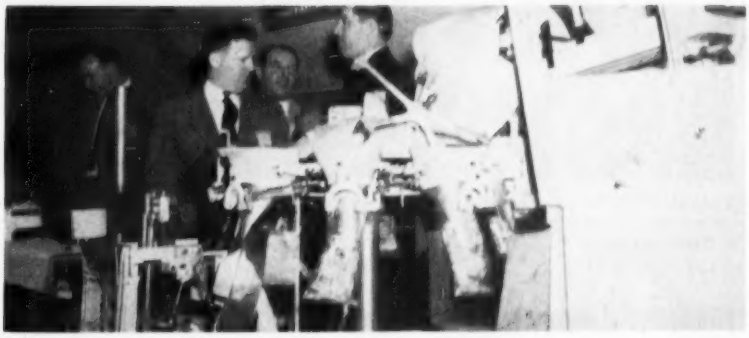


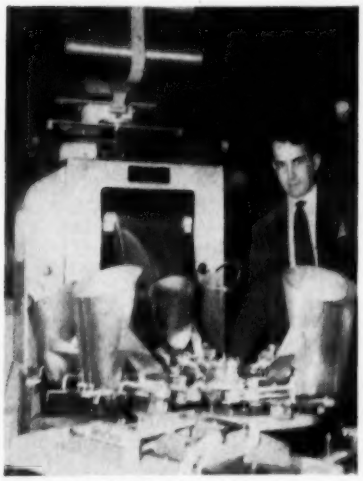
ADVANCE in fat heating. Oil is pumped from fryer, through duplex strainer, and into gas-fired, tubular-type heat-exchanger within frame of fryer. Manufacturer: J. D. Ferry Co., Inc., Harrisburg, Pa. (105A)

WHAT'S NEW FOR CHIPPERS

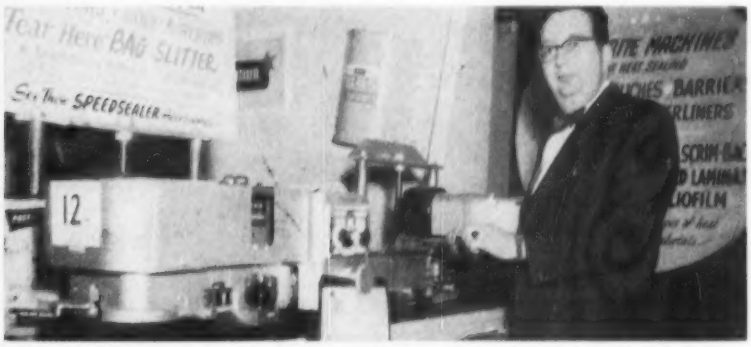
Nine new and advanced pieces of equipment exhibited at National Potato Chip Institute Conference in Chicago



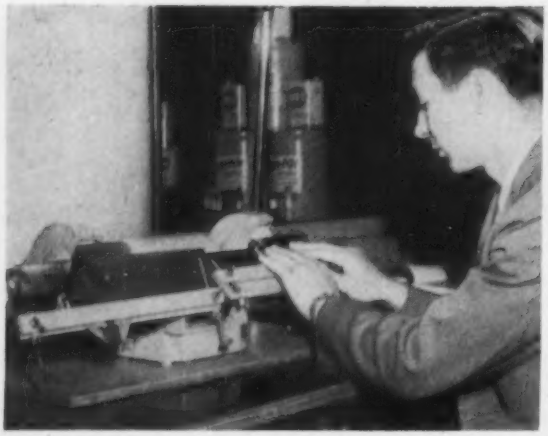
BAGGING machine features automatic transfer of bags from rotary filling turret to heat sealer. Special unit sets up bags for sealing. It comprises two vertical fingers that spread tops of bags, plus horizontal, gear-operated bag closers.—Wright Machinery Co., Durham, N. C. (105C)



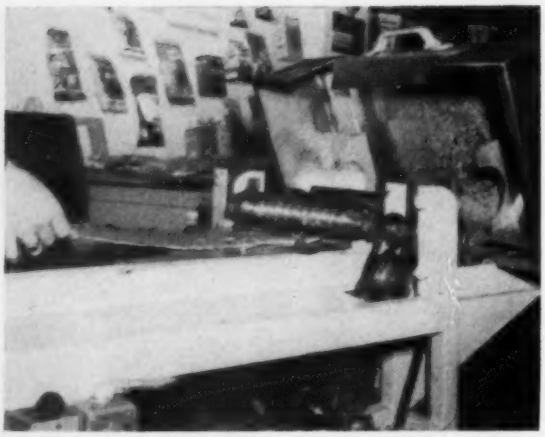
BELT-DRIVEN vibrators on two turret spouts at this weighing unit's discharge uniformly settle chips in bags. Fully automatic machine, with bag folder, sealer, and coder, reportedly has 200 less parts than former model.—The Woodman Co., Decatur, Ga. (105B)



BAG SEALING unit converts for either manual or automatic transfer of bags conveyed from filler. It is also equipped with bag folding, code-dating, and "tear here" slitting devices. Maker: Pack-Rite Machines, Milwaukee. (105D)

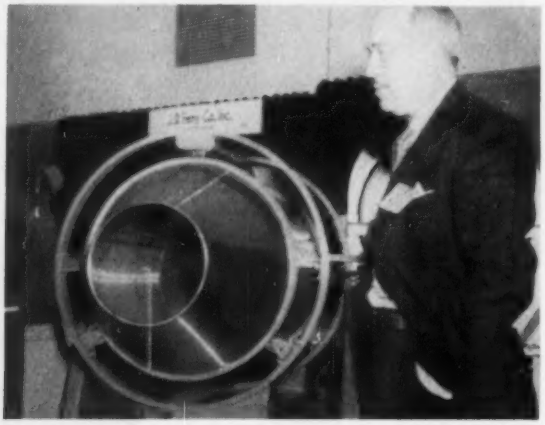


NEW GRINDER for potato-machine slicing knives hollow-sharpens blades to razor-edge. Blades then smoothly slice chips and assure them natural curl.—Hudson Equipment Co., Sylvania, Ohio. (106A)

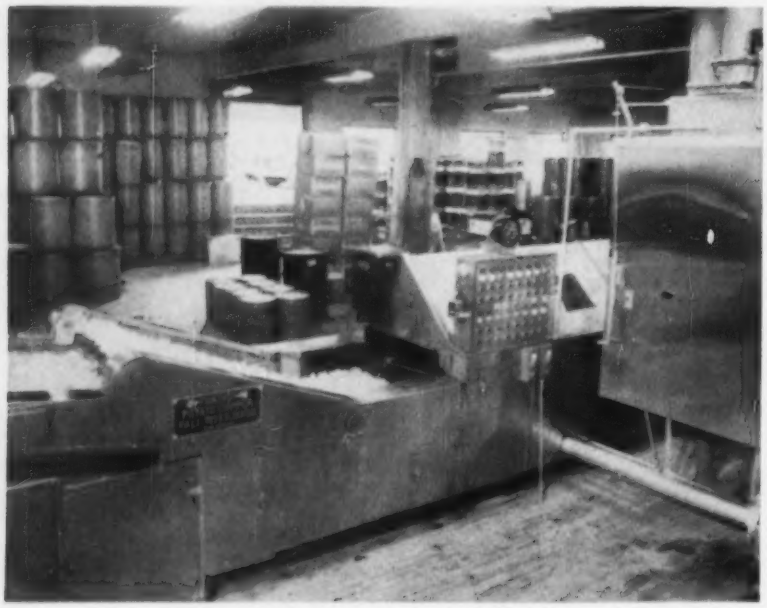


BACON-SKIN cutter has 13 stainless rotary knives. Corrugated rolls, below and behind, discharge cut pieces, at 1,000-lb.-per-hr. rate, into portable bin.—A-M Machinery Co., Dallas. (106B)

VACUUM-TYPE gravity-fed fat filter has double capacity of former unit. Self-contained filter is mounted on heavy roller-bearing oil-resistant casters.—Vacuum Filter Mfg. Co., Chicago. (106C)



VARI-SPEED tumbler coats chips with barbecue seasoning, popcorn with cheese. Unit (6-bu. capacity) has four 1½-in.-thick baffles, hand-operated tilter.—Krispy Kist Korn Mach. Co., Chicago. (106D)

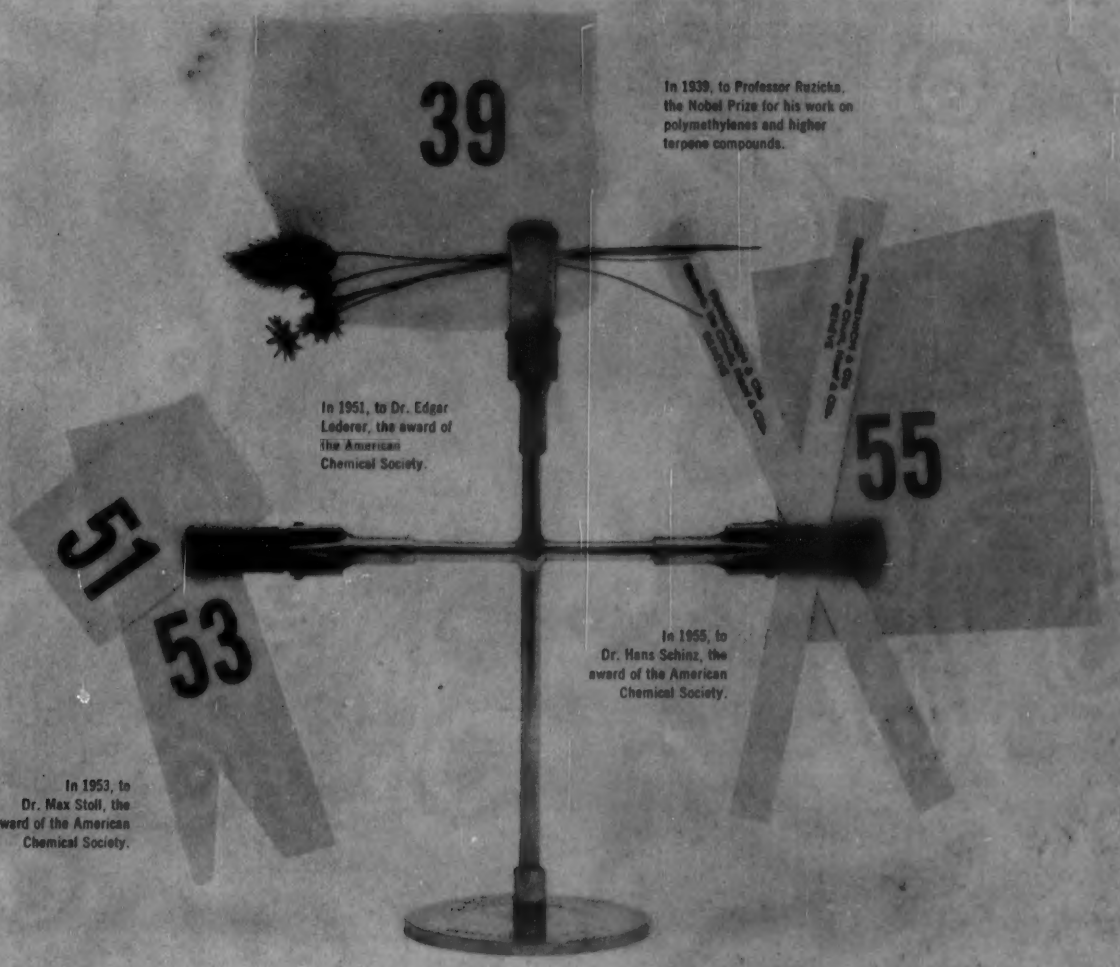


HIGH-CAPACITY fryer employs low volume of oil. Heat exchanger, with no fire under fryer, produces efficient heat. Eliminated are burnt particles under fryer.—Salvo Machine Co., Fall River, Mass. (106E)

☆

For More Information

—on any of these units, circle key numbers (given at ends of captions) on the handy Readers' Service Card—in the back of the book.


39
In 1939, to Professor Ruzicka, the Nobel Prize for his work on polymethylenes and higher terpene compounds.
In 1951, to Dr. Edgar Lederer, the award of the American Chemical Society.
55
51
53
In 1955, to Dr. Hans Schinz, the award of the American Chemical Society.
In 1953, to Dr. Max Stoll, the award of the American Chemical Society.

an award . . an award . . an award
and now another award
to a member of the research staff
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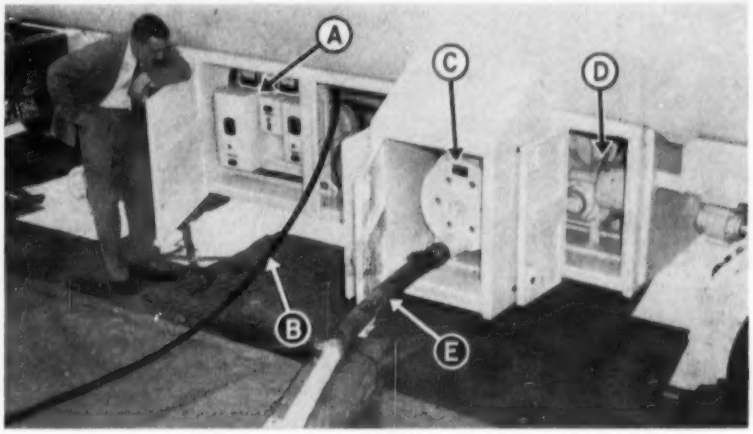
REM-CRU TITANIUM REM-CRU TITANIUM, INC., MIDLAND, PENNSYLVANIA

ONE of new units is this 45,000-lb. capacity tandem-axle Fruehauf. It features 2-way screw conveyors. In large compartment (A) is actuator (Atkinson) that effects final delivery of flour under air pressure. Inside (B) is motor for conveyors, (C) is conveyor gear box, and at (D) is seen thrust bearing of one screw.

New Vehicles abolish old hurdles that have hobbled flour deliveries . . . Screw-and-air material-moving devices incorporated in designs . . . Myriad companies that lack rail sidings offer big potential for the streamlined bulk service



CLOSEUP of compact unloading mechanism. Shown are: (A) Controls for trailer motors, (B) jumper cable from plant power outlet, (C) actuator, (D) its motor, and (E) discharge line to plant's flour storage.

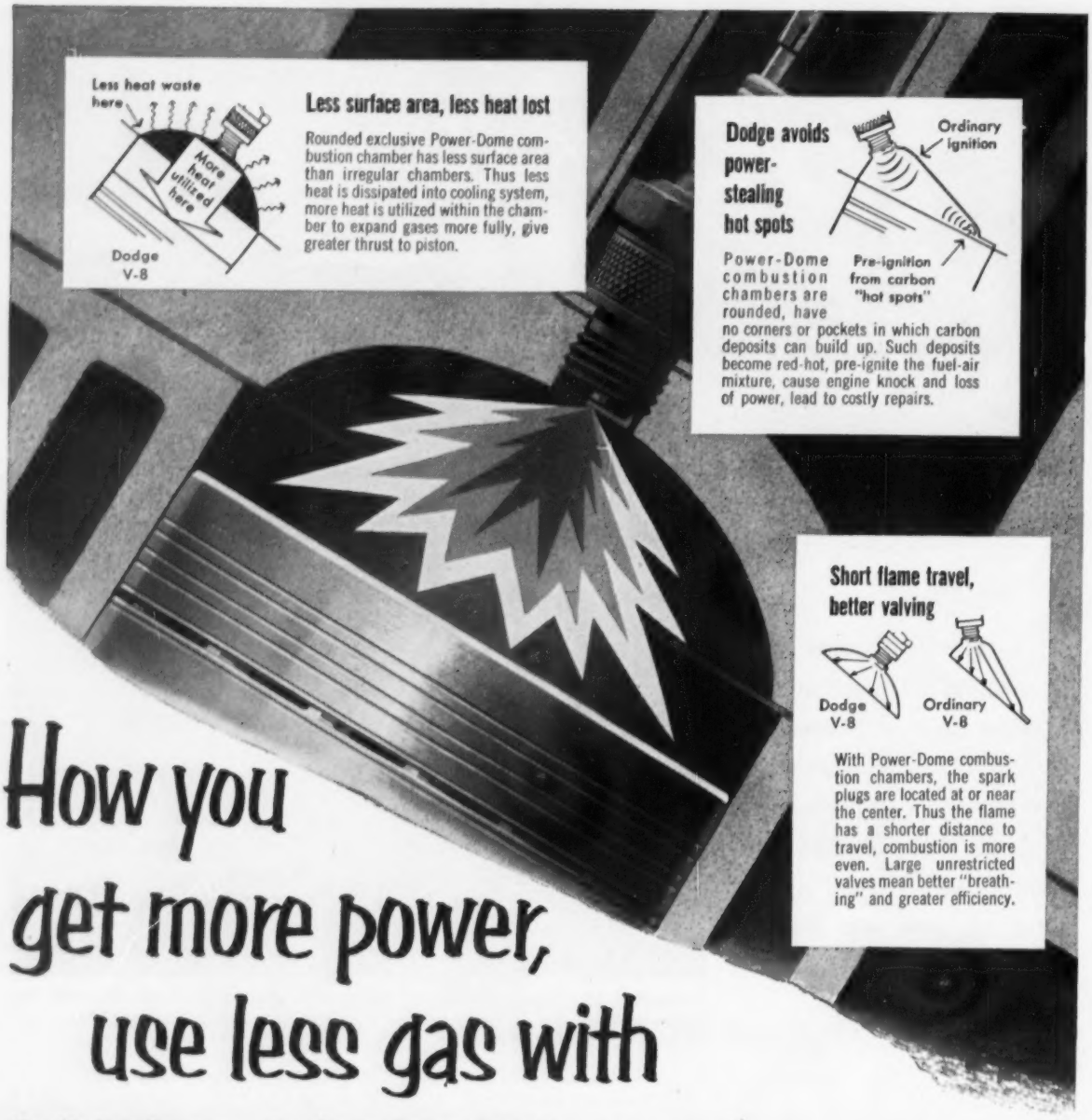
Self-Unloading Highway Trailers Flow Bulk Goods Right Into Plant

TWO NEW TYPES of self-unloading highway tank trailers are notably contributing in the recent swing to bulk deliveries of food ingredients. ▶They enable direct bulk delivery of flour from nearby mills or storage plants to bakeries that lack rail sidings.

Both units effect final delivery through hoses under air pressure, but differ in the manner of feeding flour from the trailer tank to the unloading mechanism. One type combines a pneumatic principle with a rotary feeder, while the other uses two or more screw conveyors and a rotating-vane type pump.

In each case, this equipment is an integral part of the trailer. But the power source for operating it is at suitably located 220-440v. outlets at the bakery plant, rather than the hauling tractors' engines. Latter serve, therefore, only to move trailers between mills and points of pickup and final delivery.

We will detail the construction and operation of both units—the Gramm-Fuller bulk flour trailer (Gramm Trailer Corp., Lima, Ohio, and Fuller Co., Catasauqua, Pa.) and the Frue-



Less surface area, less heat lost

Rounded exclusive Power-Dome combustion chamber has less surface area than irregular chambers. Thus less heat is dissipated into cooling system, more heat is utilized within the chamber to expand gases more fully, give greater thrust to piston.

Dodge avoids power-stealing hot spots

Power-Dome combustion chambers are rounded, have no corners or pockets in which carbon deposits can build up. Such deposits become red-hot, pre-ignite the fuel-air mixture, cause engine knock and loss of power, lead to costly repairs.

Short flame travel, better valving

With Power-Dome combustion chambers, the spark plugs are located at or near the center. Thus the flame has a shorter distance to travel, combustion is more even. Large unrestricted valves mean better "breathing" and greater efficiency.

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Look at the pictures and captions shown on this page—then, for further details and an eye-opening road test, see your dependable Dodge Truck dealer!

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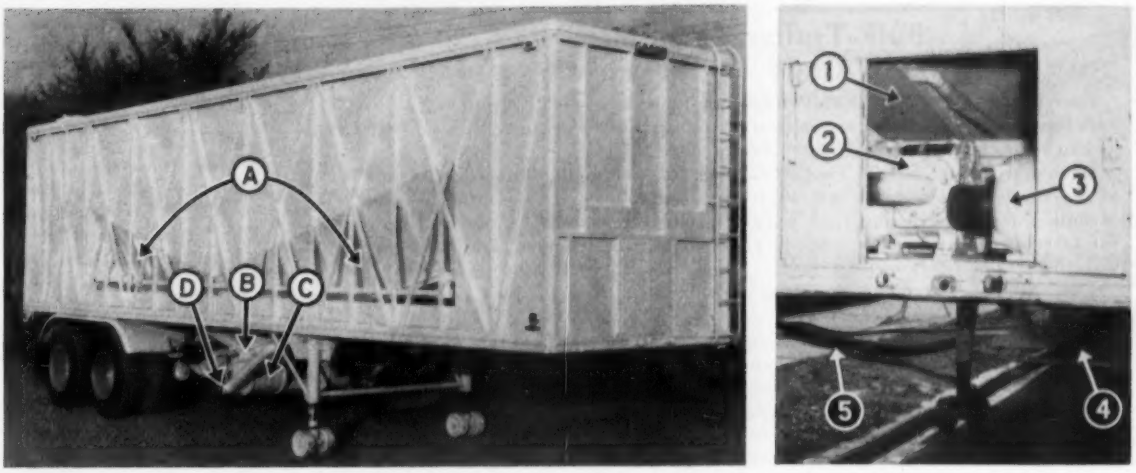


OTHER new tanker is Gramm (left above) that hauls up to 44,000 lb. Airslide trenches (A) deliver flour to collector (B), which discharges into feeder (C). Hose with sanitary fitting is connected at (D). All these components are duplicated on other side. Right photo reveals front end of trailer, showing (1) bottom of one Airslide, (2) blower, and (3) large motor. At (4) is feeder, and (5) is discharge.

hauf-Atkinson trailer (Fruehauf Trailer Co., Detroit, and Atkinson Milling Co., Minneapolis).

First, the Gramm-Fuller: This unit consists of a 32-ft. tandem-axle trailer, complete with rectangular-topped tank of 1,320 cu. ft. capacity. It carries from 40,000 to 44,000 lb. or 400 to 440 bags of flour, depending on state gross vehicle weight limits and uses the Fuller Airslide for unloading (FE June '54 p. 55).

G-F's Pneumatic System

As shown in our cutaway drawing, bottom of tank is in the shape of a pair of letter W's—four trenches whose lower ends open into two separate feeders set crosswise below the trailer chassis. Each trench has a length of silicone-treated fabric (¼-in. thick by 12-in. wide), which is held at the top of a shallow V-section of light gage steel. Space between bottom of fabric and bottom of V-section forms a chamber into which low pressure air is admitted.

Flour rests directly on top of the fabric after the tank has been loaded. Admission of low-pressure air (2 psi. or less) to the underside of the fabric, permeates the latter and aerates the flour. This causes it to slide down the inclined fabric by gravity to the feeders. Thus flour does not come into contact with any mechanical device such as a screw or bucket conveyor.

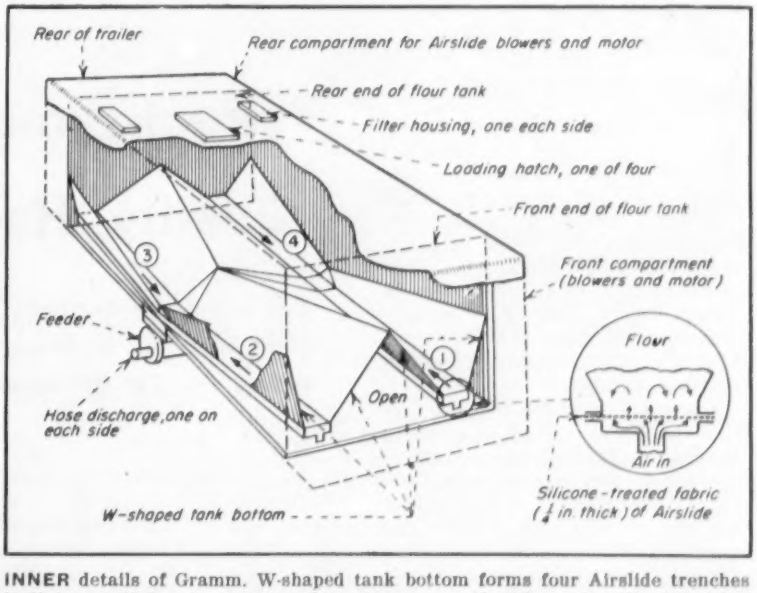
In operation, the tank may be loaded by gravity or a pneumatic system. Inflow is through four watertight hatches in the roof with two filter hatches opened to permit escape of replaced air. In unloading, low pressure air carries flour to two feeders. Here it is put under 9-10 psi. air pressure from a separate blower, and discharged through hoses (one on each side of the trailer) to plant storage.

Unloading equipment consists of three blowers driven by three a.c. motors, each deriving 220-440v. current from a source at the point of unloading. Included are: One small motor that belt-drives two blowers at the rear end of the tank trailer housing to operate the Airslides; another small motor that chain-drives the two feeders (located directly above them); and one bigger motor that belt-drives a large blower in the front end of tank trailer housing.

Pipes lead to two discharge lines between feeders and points at which discharge hoses are connected (see illustrations). They unload flour at 75 ft. above ground at the rate of 20 tons per hour.

This vehicle is designed to operate under Federal and state pure food regulations, thus the trench fabric is specially treated. Tank is made of sheet steel with proper ventilators and filters provided in the roof, which is insulated. And it is lined with an acceptable covering (plastic) capable of withstanding chemical action of chloropicrin gas (frequently used for fumigation).

In contrast to this tanker is the de-



INNER details of Gramm. W-shaped tank bottom forms four Airslide trenches inclining at 15-deg. to center outlets. Arrows on Airslides—(1), (2), (3), (4)—indicate direction of flow. Magnified section (lower right) depicts aeration of silicone-treated fabric of Airslide to "fluidize" flour.

Bulk-Trailer Economics And a Gage of the Future

Currently limiting tractor-trailer deliveries are lack of railroad trackside bulk-flour warehouses, also excessive trucking distance between mills or other pickup points and the baking plant.

In analyzing these factors, Fred D. Pfening Co., Columbus, Ohio (distributor of the Gramm-Fuller trailer described here) believes immediate development of bulk flour deliveries by road trailers lies in three areas—1. where flour can be received from nearby mills, 2. where wagon wheat is used, and 3. where wheat arrives by barge or boat.

Good examples of these conditions are offered at Buffalo, N. Y., Decatur, Ala., and Chattanooga, Tenn.

By using wagon wheat (grain transported over the road), the miller can truck-deliver as far as 150 miles and still compete with milling-in-transit freight rates. For instance, the commodity freight rate on flour between Buffalo and Syracuse, N. Y.—about 22¢—is met by one trucking contractor.

Pfening further states that only about 500 bakeries in the U. S. have their own rail sidings—a situation giving decided impetus to bulk trailers, since all remaining bakeries lack facilities to receive bulk flour cars.

However, railroads must construct intermediate trackside warehouses where truckers can install equipment for direct loading of bulk trailers or Tote Bins (Tote System, Inc., Beatrice, Neb.)

Present Applications

Hailed meanwhile is the A-1 job of a Gramm trailer in delivering bulk flour to the Minneapolis, St. Paul, and Detroit plants of American Bakeries Co. Also the excellent performance of a Fruehauf-Atkinson tanker operated by Alabama Flour Mills from its mills in Decatur.

In the latter instance, the vehicle delivers bulk flour to the Purity Bakery Co., Nashville, Tenn.—a one-way road distance of 120 miles. Formerly, this flour was shipped in bags by railroad. Result is a saving of 11¢ per bag when the bulk trailer is used.

sign of the Fruehauf-Atkinson unit, in which screw-type conveyors are employed to unload to a feeder or actuator on the trailer chassis. From there, however, flour is similarly delivered to storage under air pressure.

The F-A trailer consists of a tandem-axle chassis carrying a round-top steel tank with W-shaped bottom (two letter V's). Two conveyor screws, located in the V-bottoms, run the full length of the trailer. And the V's steep, self-cleaning slide-plates enable maximum volumetric capacity.

When turning, the screws deposit flour in a regulated flow into the patented actuator, which in turn pumps it under air pressure to storage.

Actuator is a rotating-vane type pump to which flour is fed by gravity at the top, collected within the vanes, and rotated to the bottom. An air stream under 14 to 17 lb. pressure saturates the flour, and fluidizes it with enough force to push it into the bakery storage bin.

Conveyor screws are operated from a 10 hp. motor carried in a cabinet beneath the trailer chassis and driven through a series of gear boxes. Two other motors complete the self-unloading mechanism. One is a 20 hp. unit powering blowers that move flour from the actuator to final delivery, and the other is a 2 hp. motor motivating the actuator itself.

Since power for the motors is not secured from the tractor hauling the trailer, a jumper cable is plugged into a power source at the point of unloading to get current to the trailer control panel.

Original pilot model of this design had the actuator located at the rear of the trailer with conveyors also feeding to the rear. However, the latest models place actuator in middle of trailer, with conveyors feeding from each end of the trailer toward the center outlet.

Often, center delivery is desirable, particularly when, to obtain maximum load capacity, it is necessary to locate the tandem axle at the extreme rear of the trailer. Center location also enables the actuator to be carried in a cabinet, thereby eliminating all rear-end road hazards.

Should it be necessary to make other than a center-trailer delivery, discharge port of actuator may be extended and routed to any desired location (left side, right side, front, or rear) by extending a semi-permanent pipe line with a coupling device installed.

Whether actuator is located in the center or the rear, conveyor screws *turn* in only one direction. But with the center location, each screw must simultaneously *feed* in two directions (from each end toward the center). This is accomplished by providing different flighting or fins on each half of the conveyor shaft—a left-hand flighting on the front end and a right-hand flighting on the rear end, both feeding to the center.

With the first conveyor actuated, the second may be operated simultaneously with it, or intermittently.

At the standard weight of 100 lb. per bag of flour, this trailer has a maximum load capacity of 450 bags or 45,000 lb. and tests indicate that with this unit, flour may be delivered vertically 200 ft.

• • •

Poultrymen Pinpoint Quality, Handling, Costs

Weigh these top questions: Bird bleeding . . . ★ Chicken processing . . . ★ Bruise prevention . . . ★ Pre-stuffed turkeys . . . ★ Operational savings . . . ★ Egg factors

QUALITY-IMPROVING and cost-cutting measures were spotlighted as more than 2,300 poultrymen gathered at the recent Poultry Industries' 26th Fact-Finding Conference at Kansas City, Mo.

Here are highlights of the sessions: That well-bled poultry has more sales appeal was a factor accented by Lyle L. Davis, USDA. Tests have shown, he said, that 3-lb. Leghorn chickens are adequately bled when they lose 2.9 to 3.0% of their dressed weight in 20 sec.

This is achieved by: (1) Severing

(Turn to page 115)

for • better service
• fewer losses
• easier handling

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Poultrymen Pinpoint Quality, Costs

—Continued from page 112

carotid arteries and jugular veins, (2) braining the bird and cutting carotid arteries and jugular veins, or (3) stunning the bird by striking the side of the head with a stick and severing a single carotid artery or jugular vein.

For 9-lb. Beltsville hen turkeys, a 2.9% blood loss (calculated against live weight) is sufficient. However, this amount should be higher for the same size toms. A blood loss of 2.7% of live weight in 30 sec. should produce enough bleeding of Bronze tom turkeys weighing 17 to 20 lb. live.

Adequate bleeding of turkeys was recently achieved in tests by CO_2-immobilizing and then severing carotid arteries, jugular veins, trachea, and esophagus.

Chicken Processing

Preparation of precooked chicken for the fresh market or for canning or freezing was discussed by J. G. Woodroof, Georgia Experiment Station. He said that ingredients like pimentos, cucumbers, or parsley may be used for desired color. However, the chicken flavor should not be subdued by adding large amounts of spices, condiments, or sauces.

Tests with barbequed chicken, chicken pies, and chicken sticks or croquettes indicated that many added flavors are less stable than chicken flavor and should, therefore, be used with caution.

Stability of fully cooked, deboned, seasoned chicken was considerably less than raw or lightly seasoned chicken. Natural or liquid smoke extended storage life of barbequed chickens from 3 weeks to 4 months.

Records on total edible portion (meat, skin, and broth) of chicken cuts after cooking and deboning were: Whole broilers, 74.3; breasts, 87%; thighs, 83%; legs, 74%; necks, 60%; backs, 65%; and wings, 59%. Corresponding figures were higher for hens. But they did yield more broth and fat.

Both the method of cooking (steam pressure, live steam, over live coals, infrared rays, simmering, and boiling) and the rate of cooking affected flavor, texture, and amount of broth from cooking chickens for deboning.

Curbing Bruises

A 3-yr. test made by A. T. Ringrose, University of Delaware, showed that 7.2 to 17% of broilers were bruised when the flocks were weighed on the farm and hauled in coops. These bruises, he declared, accounted for at least 75% of the losses due to downgrading. He figured that such bird damage is costing the Delmarva broiler industry at least $2,000,000 annually.

Bulk weighing of broilers and use of roller conveyors somewhat reduced bruises during handling. Number of damaged broilers weighed and loaded by this method ranged from 5.4 to 8.5%, an improvement of 20 to 50%.

Only 2.5 to 7% bruised broilers were found in flocks loaded in battery trucks (with batteries designed for this purpose). Another advantage in using battery trucks—in addition to reducing bruised birds by 70% compared with farm weighing and coop hauling—is cutting down on losses due to smothering in hot weather. Further, battery trucks delivered 21% more broilers in 26% less time with two men less, compared to hauling in coops for bulk weighing.

Pre-Stuffed Turkeys

G. T. Vallance, Shopping Bag Food Stores, told the poultrymen that the recently introduced pre-stuffed turkeys are proving a big success. Also making a hit are chicken and turkey gravies in powdered form.

Operational Savings

Norman G. Paulhus, USDA, pointed out how, with a small investment, improvements in work methods and equipment save manpower and operating time.

In one plant, a 7-man work crew with 2-wheel hand trucks required 12 man-hours to unload a 500-case truck-trailer load of eggs. But by adopting a unit-load principle with a 4-wheel hand truck and a balanced work crew, this plant was able to eliminate one man, load out 500 cases in 5.84 man-hours, and save 6.16 man-hours.

At a $1-per-hour wage rate, this plant saved $1.16 for each load handled, without any additional cost in equipment.

Power Saves Man-hours

Another plant went to electrically operated platform trucks for all operations. The former system, using dead skids with manually operated trucks, required a 3- or 4-man crew to unload and load out with platforms at truck-bed height. But with the electric truck, one man loads out a full trailer with unit loads in a matter of minutes.

When this truck reaches the company warehouse over 100 miles away, it is unloaded by the same method, and unit loads of empty cases and aluminum poultry containers are then taken on for the return trip.

A third plant adopted a fixed belt conveyor and skid method of loading out. Thus, it effectively utilized its 2nd-floor truck-loading platform. A fourth man moves unit loads of egg cases from storage to the loader at the conveyor. With this method, the 4-man crew can load a trailer of 430 cases in 26 min., or 1.73 man-hours.

Improving Eggs

E. E. Schnetzler, De Kalb Agricultural Assn., and H. B. Wallace, Hy-Line Poultry Farms, told of the tendency to over-rate the importance of air-cell size and albumen viscosity in efforts to produce and market higher quality eggs. Researchers have found that eggs with poor albumen viscosity average just as high in protein and egg solids as those with the most viscous albumen.

Breeders might do more for the industry by concentrating on improving shell strength and eliminating various types of spots on the albumen or yolks, as well as other defects that detract from consumer appeal and food value.

They measured broken-out quality—since random sample tests indicate that candling is highly inefficient and ineffective in getting proper evaluations of albumen conditions as they actually exist.

Here's what was found in breaking out over a million eggs:

1. Eggs 2-weeks old from one inbred line may have a thicker albumen than day-old eggs of another line.

2. More intense layers within a strain or inbred line tend to have the thinnest albumen.

3. White and brown eggs are different inside as well as out—albumen viscosity is higher in heavy breeds than in Leghorns, so are the number of meat spots, while white eggs almost never have meat spots but average more blood spots.

4. Light and heavy inbreeds can't be crossed to obtain the best egg qualities from each.

5. There's no genetic linkage between viscosity of albumen and number of blood or meat spots.

Editor's Note

The trend to higher efficiencies through mechanization was reflected at the show held in conjunction with the conference. There were 110 exhibitors, and several new and improved machines were photographed by a Food Engineering *editor. These will be illustrated in the April FE.*

In Behalf of Progress . . .

Give FDA More Money, But Don't Call It "FBI"

Enforcement of the Federal food law has been slipping for the past four years. But this unfortunate situation is not to the liking of the Food & Drug Administration—much less its fault.

Lack of adequate funds is the reason. For the current fiscal year, Congress allotted just over $4.8 million for FDA enforcement programs. This is half a million less than for the fiscal year ending in June, 1952. Yet in the intervening years pay scales and other costs have been rising.

The magnitude of the pinch is measured by the forced reduction in the number of field inspectors from 249 to 194 (now the number is 206).

So the inevitable happened. Factory inspections per year declined from 13,357 to 10,119—down better than 24%. At the same time, the number of import lots inspected skidded from 39,942 to 25,105, a nice drop of 37%. Laboratory analyses and other examinations were fewer by nearly 33%.

Lost year the inspectors were able to check only about 10% of the 96,000 establishments which do a substantial business in foods, drugs, and cosmetics. And their work has had to be directed primarily toward violations that would endanger health and, to a lesser extent, those involving filth. Little time or money has been left to enforce standards of quality and fill of container. So cheating has increased, as witnessed by an increasing number of complaints received by FDA.

But there is hope for some improvement. And for that credit goes to Bradshaw Mintener, former Pillsbury general counsel, and now director of FDA's operations. Through his efforts, funds may be increased enough to get enforcement programs back to the level from which they have slipped.

But this will not be good enough. In view of the substantial growth in the number and volume of processed foods in the past four or five years, plus the increase in FDA's unit costs, Congress should boost the appropriation appreciably above the former $5.3 million level. As a matter of fact, that was not enough even in 1951–52.

Mintener looks enviously at the success of the FBI in getting the money it needs from Congress. And he is said to aim at non-partisan recognition of Food & Drug as the "consumers' FBI."

Here we part company with his thinking, although agreeing with his purpose. "FBI" connotes an agency to deal with criminals, and dangerous ones at that. This would be a reflection on the high moral and ethical level of the food manufacturing industry as a whole.

The industry gives consumers a lot of quality and quantity for their money—and year by year it is giving them more. The short-changers are few and far between. Most of these are guilty through ignorance rather than intent.

Let's have more money for FDA enforcement operations. But let us not brand the food industry as a bunch of thieves, or worse, to get it.

No Such Thing As "Different" Process

There is no such thing as a food process that is different. Parts of it, yes. But in its entirety, definitely no.

All processes are made up of steps. And each of these steps is a simple, or fundamental, operation—better known as a unit operation. Rather few in number, the different types of unit operations all are widely employed in the manufacture of various types of food products.

So different food processes are alike in more ways than they are different.

You can see this in process flowsheets. These show a sequence of very common operations, such as separating, mixing, forming, coating, heat transfer, packaging, and materials handling.

Take any type of food plant and try to name one operation in it which is not found in any other type of plant. Or pick put a piece of equipment not used elsewhere—that's easier.

Take a cheese plant, for example. There you have curd cutters and cheese hoops. Not much else that isn't found in other food factories.

Stop and think about it, and you'll realize that most of the industry's progress in processing has been achieved by wide-scale adoption of better ways of performing operations first introduced in one branch of the field, or in some other industry.

Orange crystals just now are being made in a continuous vacuum evaporator first applied in a soluble-coffee plant. A water-tube boiler and a shell-and-tube heat exchanger—used in all sorts of industries—have recently been utilized to greatly improve potato chip frying.

You see what we mean.

Nice thing about a basic method—a unit operation—is that it doesn't care where it works. It will do the job in a meat plant or a bakery with equal facility.

But here's the catch: You have to know unit operations if you are to take advantage of them. You have to think in terms of them—have the unit-operation concept.

And we highly recommend the article on page 66 to help you sharpen that concept.

Celite Filtration assures perfect clarity—

adds eye appeal and buy appeal to food products

TO GIVE foods and beverages that extra quality which results in more sales appeal, leading processors depend on Celite* Filtration.

The Celite method is *efficient.* It removes even the finest suspended solids. Moreover, Celite Filtration is *economical.* It may be used with any type of conventional filter, it is almost automatic, and skilled labor is not required for routine operation. And Celite Filtration is *flexible.* To meet your specific requirements, Celite comes in nine standard grades of microscopically controlled particle size. The right balance between degree of clarity and rate of flow may be easily controlled.

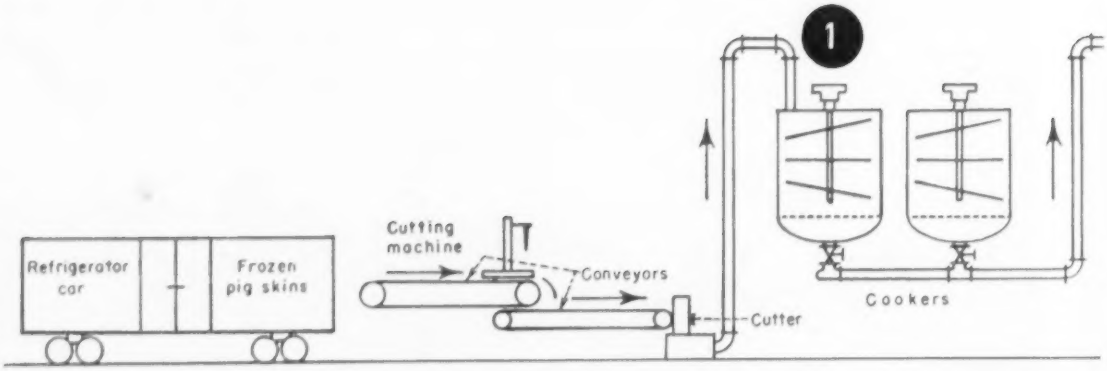
To purify water in large volume—to achieve brilliant clarity in many food products such as sugar, syrups, wine, beer, vegetable oils, cooking fats—to remove many colloidal impurities which may affect product quality . . . Celite Filtration offers unexcelled results.

A Johns-Manville Celite Filtration Engineer will gladly discuss the advantages and use of Celite in your product or production process. For his services, without obligation, write Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ontario.

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville CELITE FILTER AND PRESSING AIDS



UNFOLD HERE

Making Superior Quality Gelatin

Grayslake does it with latest processing equipment, techniques, engineering using fresh-frozen edible skins. Lab tests play important role

ADVANCED, highly sanitary, and efficiently integrated processing equipment highlight operations at Grayslake Gelatin Co., Grayslake, Ill., where 3,000 lb. of gelatin are manufactured each 8-hr. shift, 3 shifts a day.

In this spic-and-span plant, quality is constantly maintained by use of fresh-frozen edible federally inspected pork skins, handled by trained, conscientious workers and laboratory-controlled at all processing stages. The company pioneered this source of raw material and has advantageously utilized it for over 33 yr.

Frozen pork skins are received from meat packers in refrigerated cars holding about 50,000 lb. They move to the production line or to large-capacity refrigerated holding rooms (15 deg. F.).

For processing, the skins are conveyed to an electrically-operated guillotine-type knife and cut in 2-in. pieces, then go to a 44-in.-dia. rotary cutter. From here, the pieces are pneumatically conveyed to 10,000-lb.-capacity aluminum cooking vats—Point 1 on accompanying foldout flowsheet.

Cooking Dissolves Gelatin

These cookers are equipped with perforated false bottoms and steam and air coils, and they serve several purposes—washing, acidulating, and cooking. First wash, with filtered well water, takes 1½ hr., and the second ¾ hr. Then skins are acidulated for 8 hr. so that subsequent cook water may easily penetrate the collagen-bearing cells.

Again, they are washed twice for ½ hr. with air agitation. Then comes cooking with distilled water for 24-30 hr., in 3-hr., 5-deg. stages, starting at 130 F.

Cook liquor (about 7% solids) is then pumped to 1,200-gal. aluminum settling tanks. Meanwhile, skins are again cooked to extract fat, which is pumped, as No. 1 Pigskin Grease, to storage tanks. Then they move by flight conveyor to the 25,000-lb.-capacity rendering cooker.

After a 3-hr. cook at 350 F., skins are loaded into a 12-disk hydraulic press (operated at 4,000 psi.) and formed into 2x30-in. cakes that are hauled into a 150,000-lb.-capacity 90-110-deg.-F. drying room. Grease (No. 2 grade) expelled from press is pumped to storage tanks.

Gelatin liquor, after a 1-hr. settling, is pumped to 1,200-gal. aluminum tanks, where filter aid and activated carbon are introduced. Slurry is then pumped to an aluminum plate-and-frame filter—Point 3—operated at 80 psi. From here, the liquor flows to a 1,500-gal. holding tank, from which it is pumped to a 2-stage evaporator.

Vacuum is maintained in the first stage at 20 in. and in the second at 27. Liquor is concentrated to 10% solids in the 2nd-effect evaporator, and to 14% in the 1st-effect.

Step Classification

It is then pumped to a company-designed charcoal-filtering bed. Following a 15-min. filtration, liquor is discharged to a 500-gal. tank. Here, filter aid is added. Pumping through a plate-and-frame-type filter press follows. Clarified liquor is collected in two 750-gal. holding tanks.

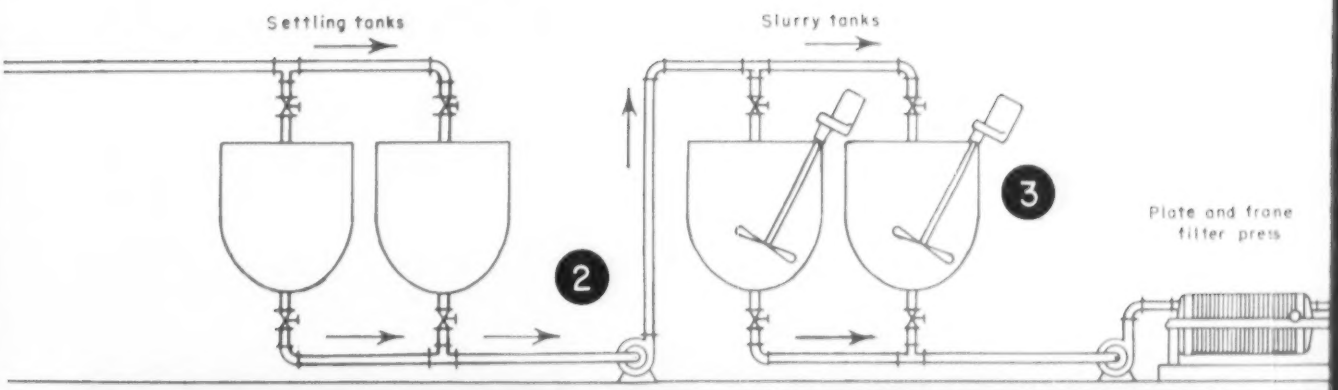
Chill-solidifying is the next step. Gelatin liquor is pumped onto a flanged, sanitary rubber belt conveyor traveling through a 6x65-ft. cooling tunnel at a rate of 12 fpm. In the tunnel, 25-deg.-F. cold washed air is circulated (100 fpm.) over the ½-in.-thick layer of liquor.

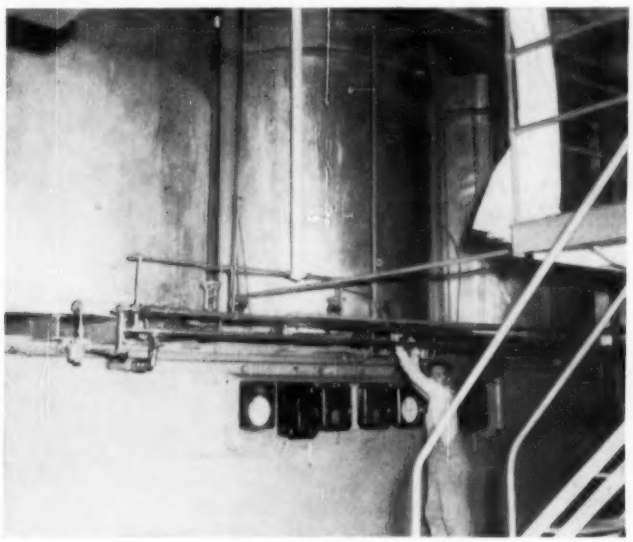
Chilled Liquor Is Cut and Dried

At end of cooling belt—Point 5—sheets of congealed liquor are slit into strips by stationary doctor blades, then automatically transferred to a sanitary rubber belt. Here, a rotary knife cuts the strips in 2-ft. sections (about 30-lb.)

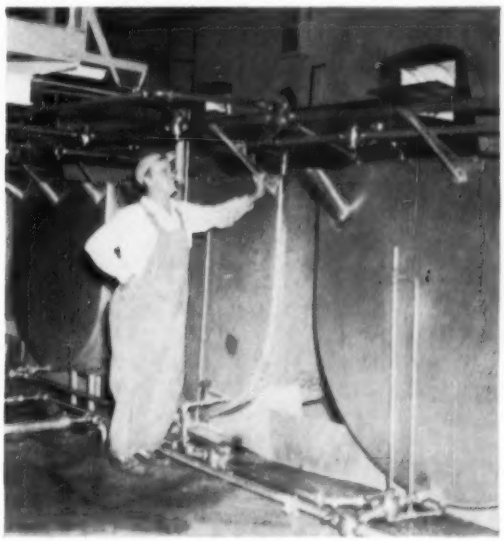
SETTLING

FILTERING





1 **IN THESE** 10,000-lb.-capacity aluminum tanks, chopped skins are washed, acidulated, washed again, then cooked.



2 **SETTLING TANKS** receive liquor from cookers, hold it 1 hr. It is then pumped to slurry tank.

3 **FI** w

which are transferred by a doctor knife to Monel, aluminum, or stainless screen trays. These are loaded, 32 to a dolly and moved into four drying rooms, where they are dried to 93% solids. This operation, taking 6 hr., is achieved in stages from 100 to 125 deg. F.

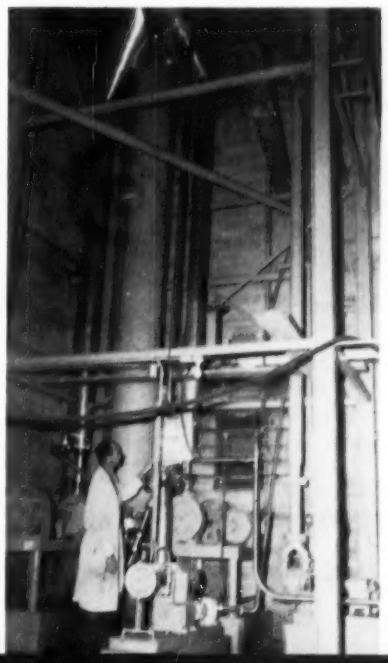
Drying air is first filtered, then heated to desired temperature as huge fans force it (400,000-ft.³/min.) over steam-heated coils.

Dried gelatin is next fed to a crusher, then conveyed to a hammermill—Point 7. An electro-magnet protects against metal particles. Pulverized gelatin is then scaled into stock-lot drums holding 225 lb. At this point the product is thoroughly laboratory analyzed as to physical and bacteriological characteristics.

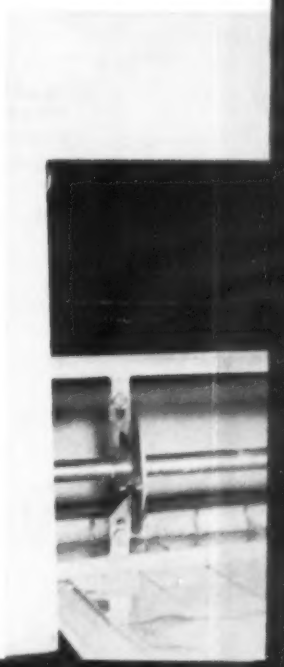
Stock-lots are finally blended according to customer specifications, using an eccentrically-driven, horizontal-type, rotary blender (5,000-lb. capacity). Here, final laboratory checks are made on the finished stock. Gelatin is then packed in 250-lb. fiberboard drums lined with polyethelene, and sealed.

Acknowledgment for accompanying flowsheet details is made to John H. Epstein, president, Grayslake Gelatin Co., and John T. May, plant superintendent.

4 **TWO-STAGE EVAPORATOR** concentrates liquor to 14% solids.



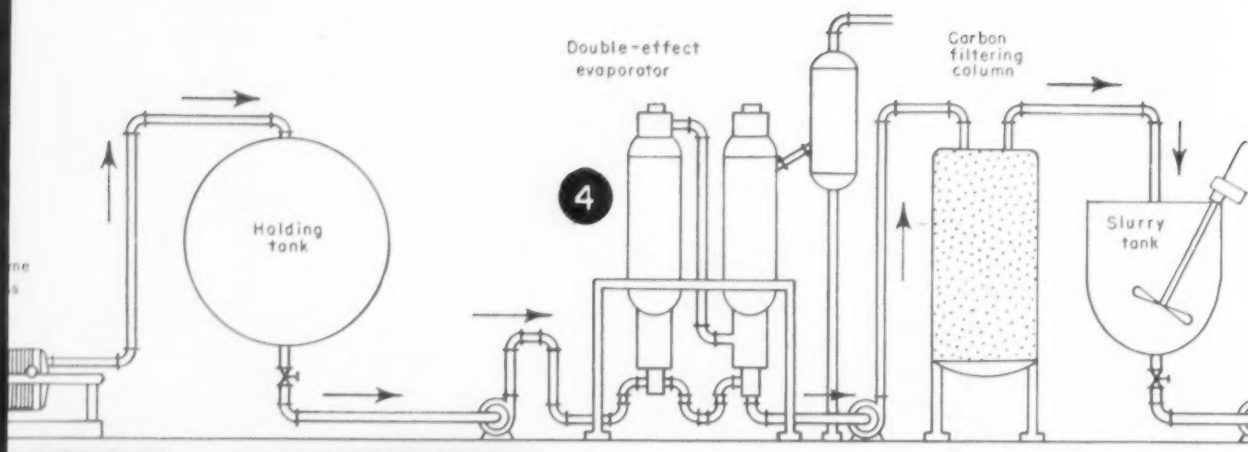
5 **LIQUOR** congeals in cooling tunnel. Then it

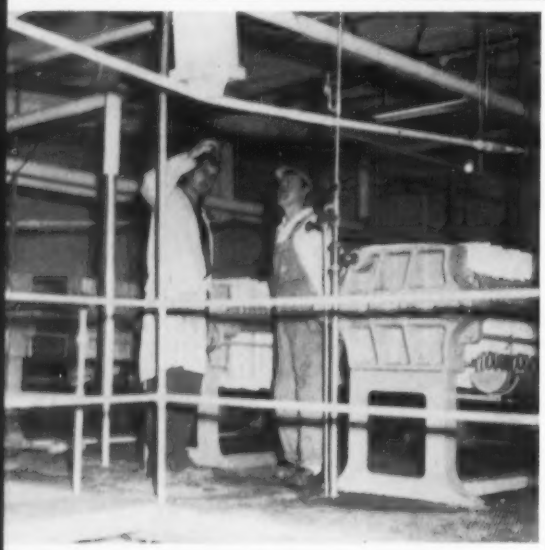


FE PICTURE FLOWSHEET NO. 74

CONCENTRATING

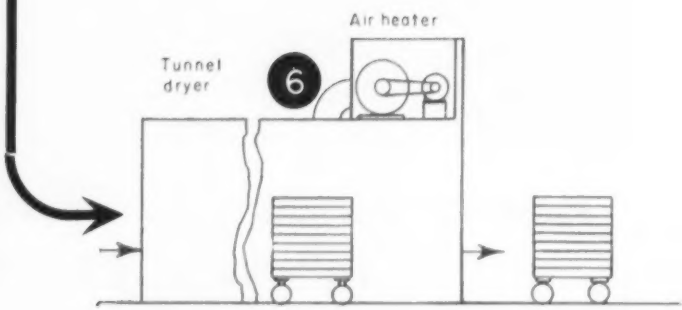
FILTERIN





3 **FILTER PRESSES** clarify liquor that has been slurried with filter aid and activated carbon.

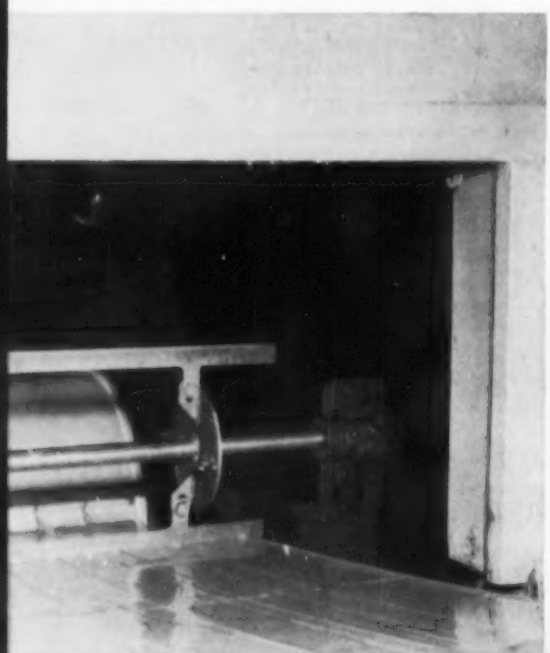
DRYING



in ½-in.-thick sheets as it moves through 65-ft.-long hen it is cut in strips by stationary knives.

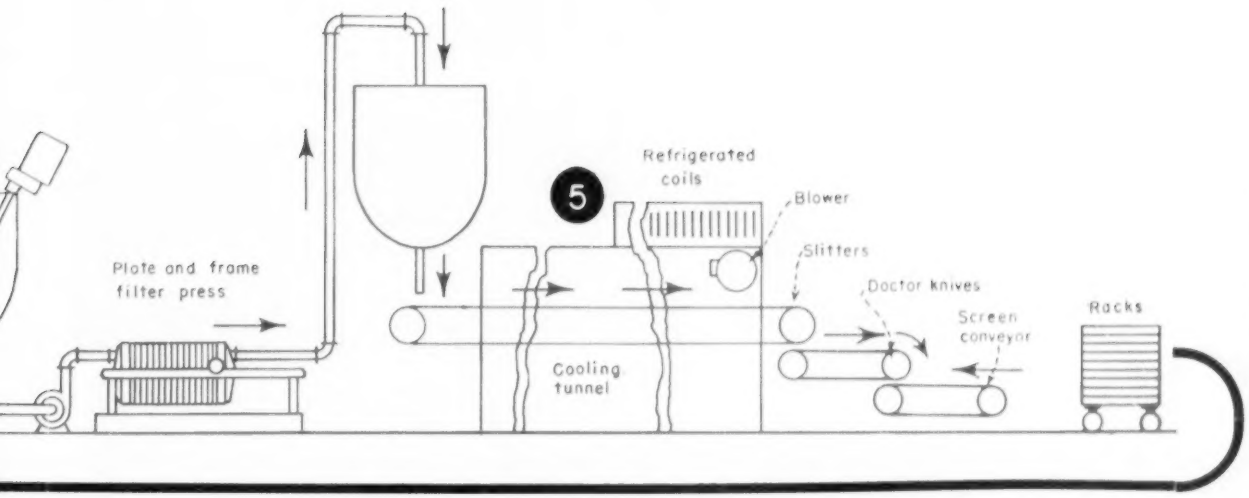
6 **DOLLYS** loaded with trays of gelatin strips go to dryer, where hot air circulates at high speed.

7 **HAMME** Magnetic



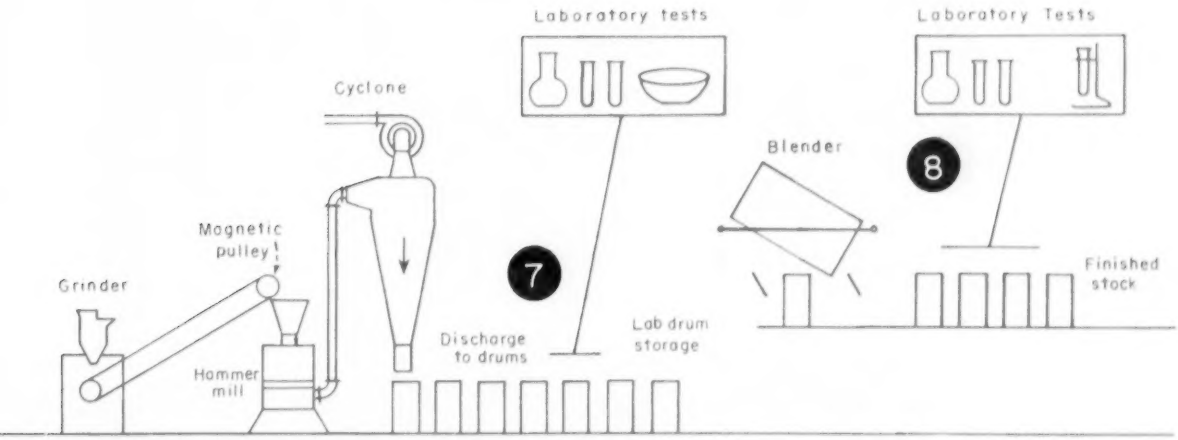
RING

COOLING



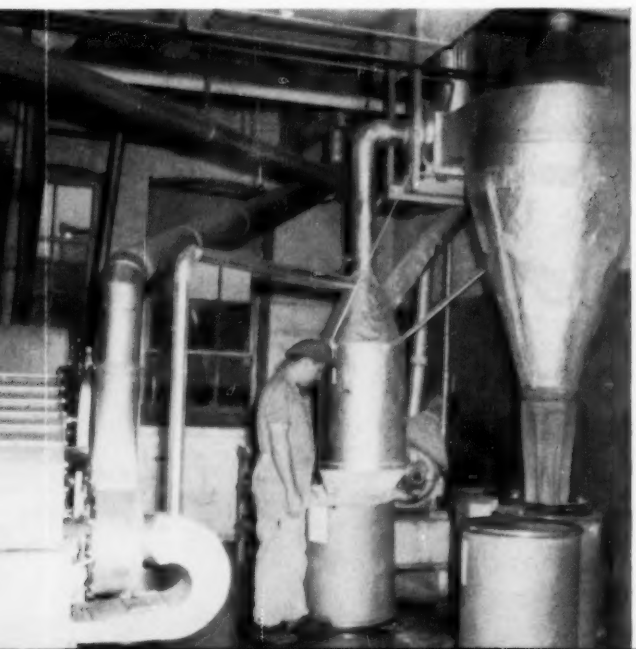
GRINDING

BLENDING

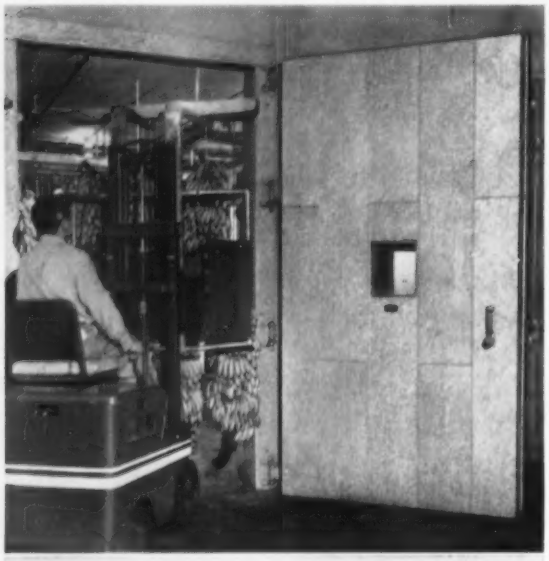


MMERMILL pulverizes gelatin, then it is filled in stocklot drums. gnetic pulley protects against stray metal.

8 **BLENDER** mixes stocklots according to customers' specifications. Final filling in drums follows.



Containing 330,000 sq. ft. of storage space, this warehouse of the Associated Grocers Co-Op in Seattle is the largest of its kind in the Pacific Northwest.



High JAMISON Doors Fit into Novel Time-Saving Method of Handling Bananas

It takes only one trip and a minimum of time to move numerous bunches of bananas to the ripening rooms in this Associated Grocers warehouse. Bananas suspended from a cross-bar are carried by fork lift truck to one of the 20 doors. Here, Jamison Standard Doors provide such ample head room that the truck can easily pass through and place the cross-bar on supporting beams.

Completely metal-clad, the Jamison Doors offer the strength needed to withstand hard usage. Two Wedgetight Fasteners assure a tight seal and are interconnected to release simultaneously at a touch of the handle.

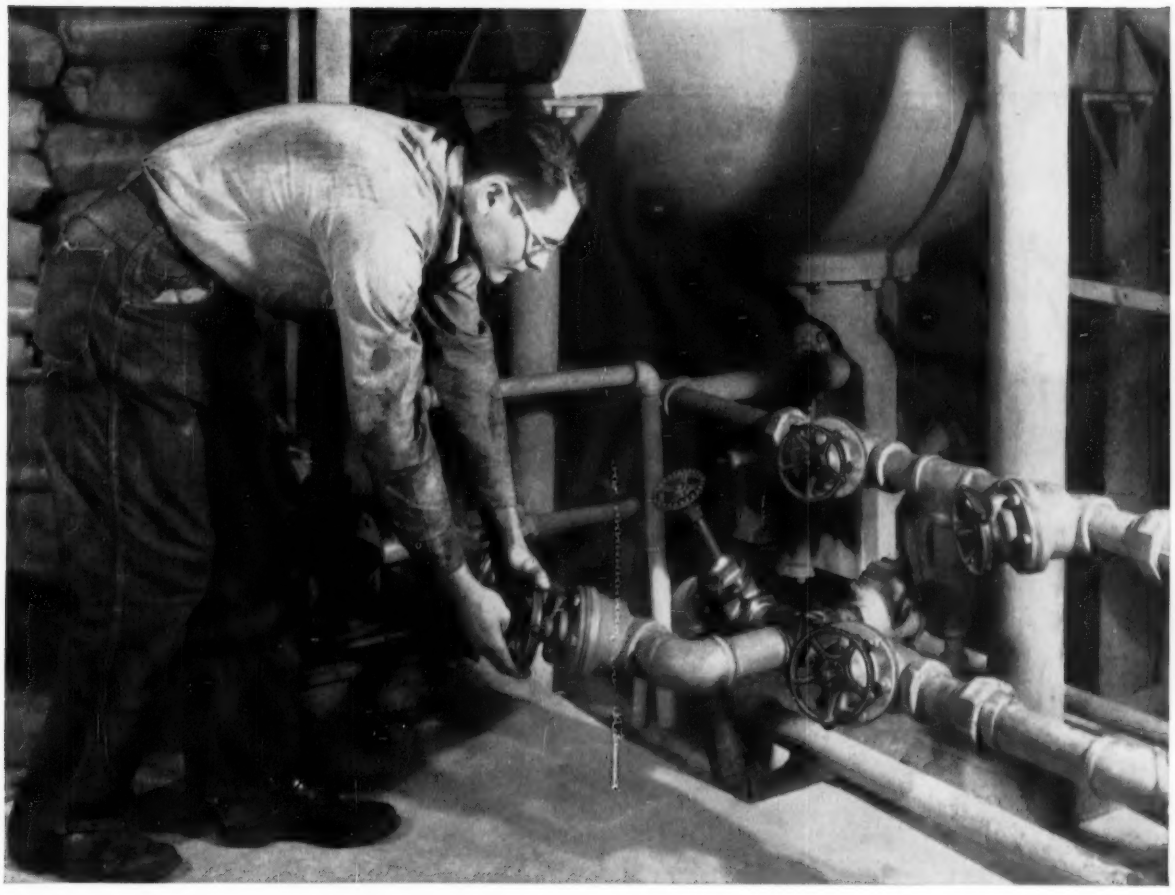
For additional information about cold storage doors, consult your architect or write to Jamison Cold Storage Door Co., Hagerstown, Maryland, U. S. A.

JAMISON
HAGERSTOWN, MARYLAND, U. S. A.

More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.

Architect—
Robert Ross
Consulting Engineer—
Richard Stern
General Contractor—
Morrison Knudsen
Insulation Contractor—
Northwest Cork and Asbestos
Seattle, Washington

Bananas move quickly in and out of ripening rooms through this battery of 20 Jamison Metal-Clad Standard Doors. Stored bananas can be inspected through peep-holes without opening doors.



Heavy fluids can't hinder working parts in these CRANE VALVES

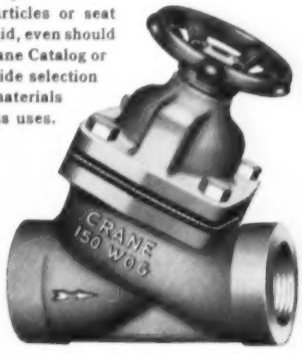
THIS CASE HISTORY tells how the United States Playing Card Co., Cincinnati, solved—with Crane Diaphragm Valves—a costly problem of piping heavy enamels for paper coating.

The trouble was in the plug cocks and conventional gate valves formerly used in the enamel lines. During normal shutdowns the heavy liquid would build up on seating surfaces, in stem threads and working parts. The cocks and gates would "freeze up" . . . were hard to operate . . . couldn't be shut tight. The condition hampered production . . . made floors messy and dangerous . . . pushed maintenance costs sky-high.

Replacing with Crane Packless Diaphragm Valves stopped the trouble completely. Their sealed-to-fluid bonnet and pliable neoprene disc insert did the trick. After more than 4 years, all 48 Crane valves installed—with no maintenance whatsoever—are still seating tight . . . still operating freely and smoothly.

CRANE PACKLESS DIAPHRAGM VALVES

Working parts are safely out of contact with line fluid. The diaphragm seals the bonnet—that's all it does, giving it longer life. The independent disc with pliable insert seats tightly on foreign particles or seat deposits . . . and controls fluid, even should diaphragm fail. See your Crane Catalog or Crane Representative for wide selection of body, bonnet, and trim materials in these valves for countless uses.



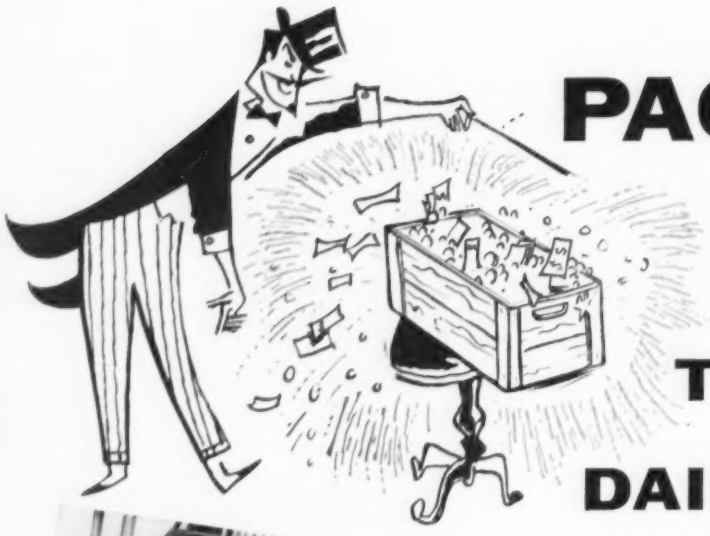
CRANE CO.

General Offices: 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

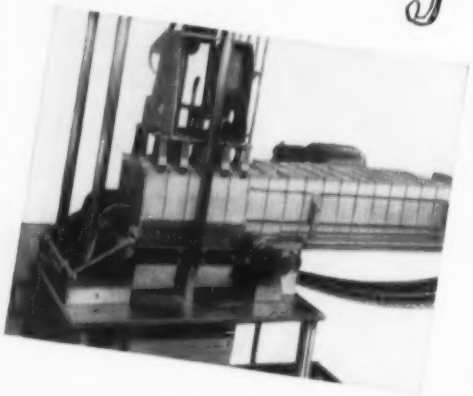
VALVES • FITTINGS • PIPE • KITCHENS • PLUMBING • HEATING

CRANE'S FIRST CENTURY . . . 1855-1955

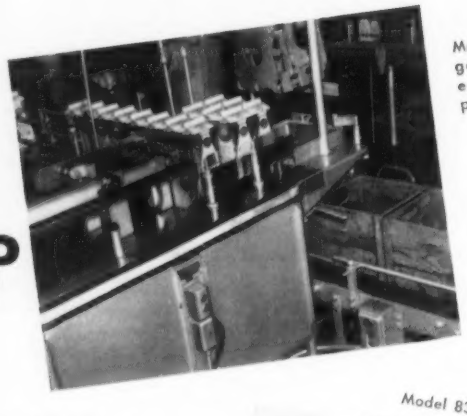
For more information, use coupon on last page.



PACKAGING MAGIC THAT BOOSTS DAIRY PROFITS



Model 836 high speed caser for flat-top or gable-top fibre containers in quart, pint and ½-pint sizes.



Model 834 for flat-top or gable-top fibre containers in ½-gallon, quart, pint and ½-pint sizes.

AUTOMATIC CASING ON STANDARD-KNAPP EQUIPMENT

If you are using manual casing, compare your methods and costs with dairies employing Standard-Knapp automatic equipment.

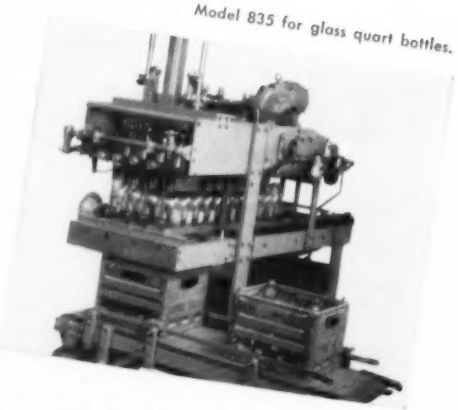
FIRST, IN SPEED — One automatic caser will load up to 12 cases per minute.

SECOND, IN PERSONNEL — As machine is automatic, manual assistance is not required. Valuable personnel are freed for more important tasks.

THIRD, IN DAMAGE TO CONTAINERS — The automatic caser does not tire. It lowers the carton gently into the cases with uniform smoothness at all times.

You no longer need or should pay the high cost of manual casing. *For the complete story, ask to see one of our representatives. For more details, write for our bulletins on AUTOMATIC MILK CASERS.*

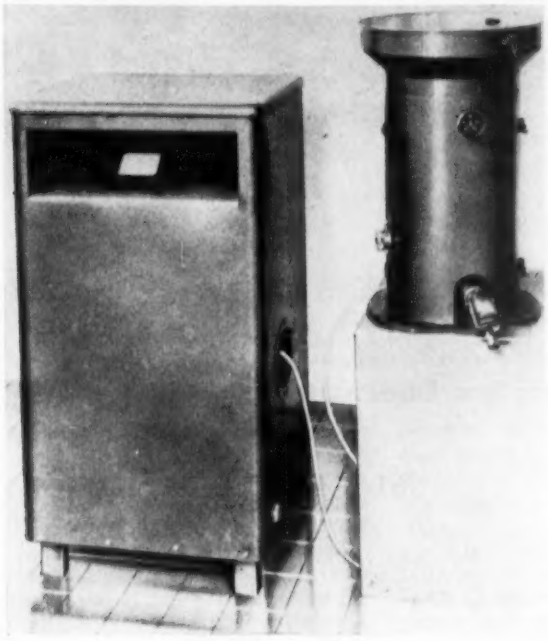
Model 835 for glass quart bottles.



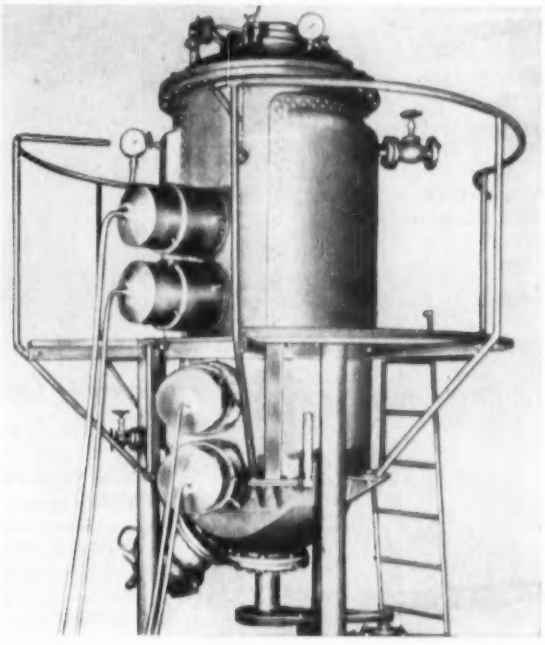
so smooth . . . so quick . . . it's PACKAGING MAGIC

STANDARD-KNAPP DIVISION OF EMHART MFG. CO. **PORTLAND, CONNECTICUT**

NEW EQUIPMENT & SUPPLIES



Chocolate Conche



Hops Extractor

Sound Waves Speed Production, Improve Quality

Ultrasonic refining and extracting units are features of new equipment now offered to the food industry in a major diversification program launched by Curtiss-Wright Corp. Other units include electronic devices for laboratory use and an industrial TV system.

Recently introduced is an ultrasonic conche—a refining unit that homogenizes chocolate masses in seconds. It offers savings in time, floor space, and energy, while reportedly improving the product's flavor. This equipment is being used in large-scale production by high-quality chocolate manufacturers in Europe.

Shown above (left) is a typical small unit that has a capacity of 250 lb. per man-hour. It can be installed in a floor space 3x5 ft. However, conches with capacities of several thousand pounds per hour are also available. Operation is continuous, and homogenization by this method is said to impart superior working characteristics for subsequent processing.

In principle, unit works on cavitation effect associated with thermodynamic and oxidation processes. It oscillates particles in the mass at the rate of 25,000 times per second in the presence of atmospheric activated oxygen. Process is highly hygienic and involves no chemicals.

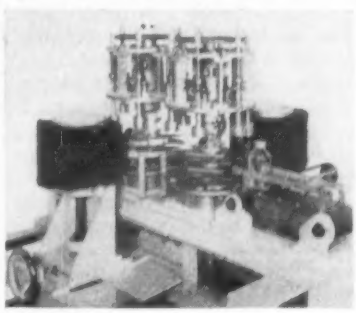
Power equipment consists of a high-frequency generator and magnetostrictive head. These are termed simple to operate with little service required. Generator may be connected to any 110/120v. 60 cycle line with ground connection. And there are no parts to be lubricated or regularly replaced.

Another application of ultrasonic energy is in a hop extractor that is said to improve beer quality while cutting production costs (FE Feb. '53, p. 48).

Compared with standard boiling methods, ultrasonic separation of aromatic and bitter substances reduces the amount of hops needed by as much as 50%. Whether new or old hops are used, beer is given a lively and freshly bitter flavor. Furthermore, the product has superior shelf stability against sedimentation and bacterial action.

Equipment shown above (right) consists of reaction vessel, several sound heads, associated electronic oscillators, and ultrasonic generator. Operation is in two steps: The first "cold" extraction, at 60 F., yields a fragrant flavor concentrate which is sterilized by ultrasonic treatment. Then "warm" extraction of the residue takes place at 212 F., and recovers 90-94% of total bitter substances. Spent hops and bitter extract are added to the wort, while flavor extract is introduced into finished brew.—*Curtiss-Wright Corp., Wood-Ridge, N. J.*

Circle 125A on Reader Service Card



Unit Washes, Polishes Variety of Bottles

In areas where water leaves a mineral deposit, this new cleaning device may be used to wash and polish the outside of many types of bottles.

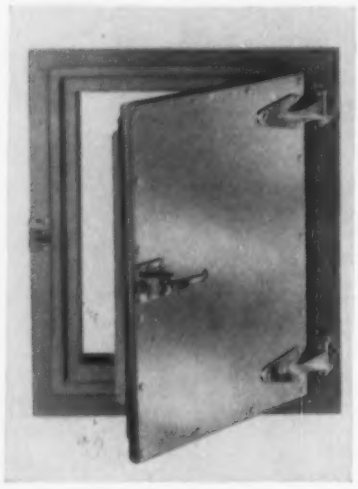
In operation, bottles are fed to the machine along a flat belt conveyor. Then two circular tables rotate them past a dry steam spray, and against two long-trim Nylon brushes. This

cleans the necks as well as the large outside diameter.

Machine is adjustable to take bottles of different height, and its carrying disks are interchangeable to handle bottles of varying diameter. Further, operating speed may be geared to changing production requirements.

Entire unit is hooded and connected with an air exhaust system that keeps steam condensation at a minimum.—*Fuller Brush Co., Hartford 2, Conn.*

Circle 125B on Reader Service Card



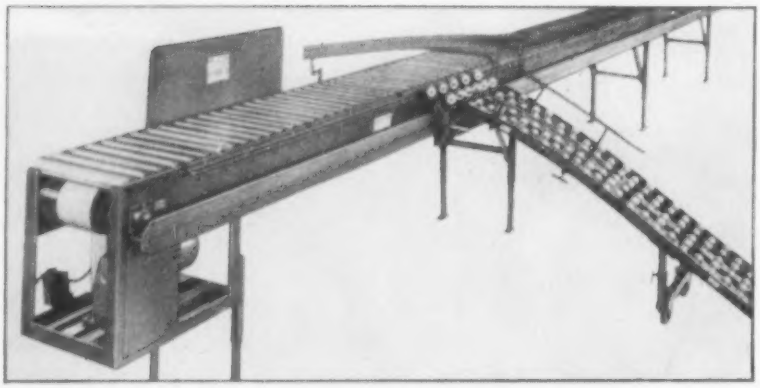
Truck Ventilator Door Made of Fiber Glass

Of interest to operators of insulated trucks and trailers is a new ventilator door made of reinforced fiber glass. Door is reported not to warp, expand or contract. It will not rot, transfer odors or absorb moisture. Light and strong, door is claimed to save reefer operators many pounds of dead weight and to reduce to a minimum down time caused by door failure.

Most important factor, according to maker's engineers, is elimination of metal-to-metal contact. Door permits no temperature leaks, insuring successful refrigeration. As moisture build-up around door edges is minimized and accumulation of ice is prevented, door does not freeze shut.

Door frame, manufactured in several sizes, is of permanent, one-piece, all-plastic construction. Plastic door has 2 in. of insulation and is faced with a sheet of aluminum on which the necessary chrome hardware is attached.—*U. S. Equipment Co., Inc. Willow Grove, Pa.*

Circle 126A on Reader Service Card



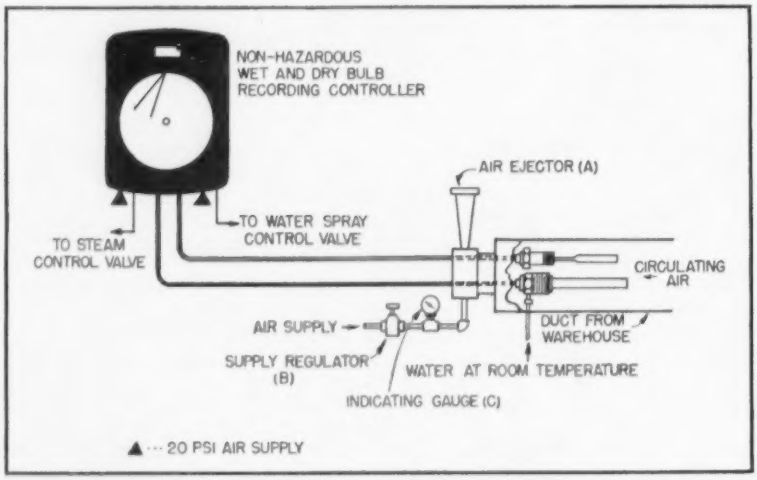
Movable Conveyor Spur Eases Material Handling

High-speed feeding of inspection and packaging lines, and general warehousing operations are applications cited for this movable spur and diverting rail attachment.

Known as Trav-A-Spur, the device is built as a single unit to travel the entire length of the company's standard live-roller conveyor. Ball bearings are used throughout and the unit moves on rails mounted on each side of the conveyor. Caster wheels that run on the floor support its discharge end. Thus, the unit may quickly be shifted from one station to another and is held rigidly in place by a single, lever-action cam clamp.

Spurs are available in height adjustments to match the conveyors. Standard widths are 11½ in., 15 in., 18 in., and 24 in., with lengths to suit particular requirements.—*Metzgar Conveyor Co., 493 Douglas St. N. W., Grand Rapids 4, Mich.*

Circle 126B on Reader Service Card



Simple Rig Curbs Explosion Hazard in Humidity Control

For controlling and/or recording humidity in dust-bearing atmospheres, this system is cited as accurate, simple, and non-hazardous. Furthermore, it has been used successfully in grain mills to eliminate expensive explosion-proof equipment.

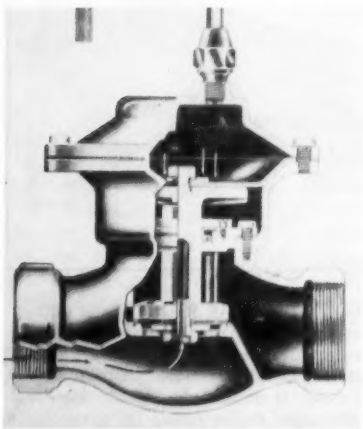
As shown in the accompanying diagram, a wet and dry bulb recorder-controller (Foxboro) is connected to a standard porous sleeve installed in a small enclosure. Instrument's wet and dry bulbs are enclosed in a simple metal housing, one end of which is open to the hazardous area. And the other end connects to air ejector (A).

Operating on air from the plant's compressor, the ejector is supplied through regulator (B) and indicating gage (C). Thus, partial vacuum created by the ejector continuously draws sample air into the enclosure and past the wet bulb. On the basis of

temperature measurements of the wet and dry bulbs, the instrument operates control valves in water sprays and steam lines to maintain desired humidity.

Housing for the measuring bulbs can be a small length of stove pipe, easily constructed by a tinsmith using commonly available materials. The ejector (Penberthy Series 20 "XL-96" or equivalent) may be obtained from most piping suppliers and replaces an explosion-proof blower. And as an extra precaution, the control instrument has a spring-wound chart drive (24-hr. or 7-day movements) instead of the electrical or pneumatic types. Therefore, it may be safely located in the danger zone.—*The Foxboro Co., Foxboro, Mass.*

Circle 126C on Reader Service Card



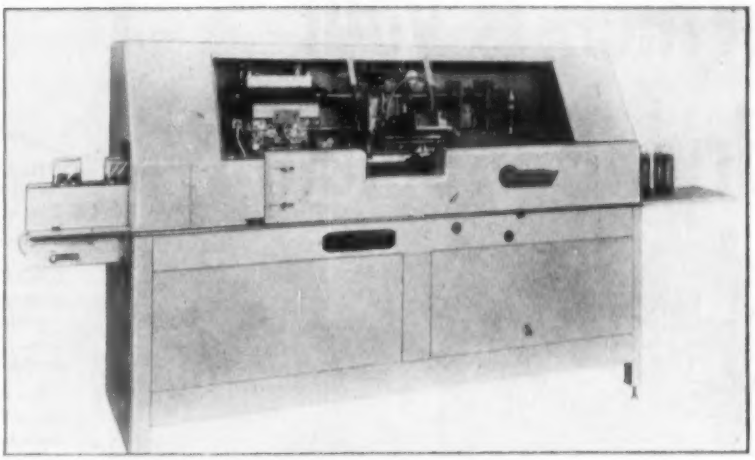
New Non-Ferrous Valves Have Wide Application

Designed for efficient handling of air, gases, water, oil and other liquids is a new line of brass, pressure-operated valves.

Called Hydra-Matic, they are of diaphragm construction and operate on a 3 to 1 ratio. Valves can be remotely controlled by means of line pressure through a by-pass tube, pressure from separate source through a three-way pilot valve, or by line pressure through a hole in the plunger of the unit. Pilot valves can be hand-operated, or of the solenoid type connected to a time clock or other signalling device.

Valves are made in five sizes, 1 to 3 in., and furnished with threaded pipe connections in all sizes through 2 in., while all larger sizes have flanged connections. — *Telsco Fittings Div., 5422 Redfield St., Dallas, Tex.*

Circle 127A on Reader Service Card



Fully Automatic Bag Sealer and Header

Expensive hand labor in packaging operations reportedly may be eliminated with this new automatic bag-sealing and header-applying machine. Unit operates at 65 units per min., and is quickly adjusted to handle a wide range of gusset-type cellophane bags.

This Model L-2 receives filled bags from the packing conveyor and times them into the machine. Unit then tucks the gusset, applies header or label, and heat-seals the bag and label. Latter may be either plain or thermoplastic to which code or date may be automatically applied.

In addition to eliminating the hand operation for applying headers, this machine is designed to give uniform closures with proper placement of labels. Thus, faster operation and more attractive packages are said to result. Furthermore, the unit's inside mechanism is easily accessible for adjustment and maintenance.—*Peters Machinery Co., 4700 N. Ravenswood Ave., Chicago 40.*

Circle 127B on Reader Service Card

Cleans, Aerates Flour Going To Mixer

Built for continuous duty and complete elimination of foreign matter from flour, this sifter features a gyrating screen which delivers clean and properly aerated flour to the mixer. Gyrating action of screen, together with ball cleaning device, provides maximum screening capacity per sq. ft. of screening area.

This device consists of a special mesh ball-retainer screen that provides many rebound points for each ball compartment. Caroming balls vibrate screen, keeping cloth open and free for efficient screening.

With sifter all moths, weevils, cobwebs, lint, sticks and other particles are removed intact. They are never crushed and forced through screen cloth but flow over end of screen into a separate container provided for the purpose.

Sifters are built in six sizes with 1, 2, 3, 4, or 5 separations.—*The J. H. Day Company, Inc., 1151 Harrison Ave., Cincinnati 22.*

Circle 127C on Reader Service Card

Which is your drying problem?

- ☐ SLOW START-UPS
- ☐ ERRATIC TEMPERATURES
- ☐ LOW OUTPUT
- ☐ UNEVEN DRYING
- ☐ PRODUCT SPOILAGE
- ☐ HIGH STEAM CONSUMPTION
- ☐ VARIABLE DRYING RATES

Often the solution is simple and inexpensive...

While it's human to blame these dryer problems on the dryers themselves, the truth is that they're often due to...

...use of the wrong type of steam trap, causing equipment to waterlog... or heat-robbing air in steam spaces ...or wasteful, unreliable, manual temperature control.

Any one of these could cause poor dryer performance... loss of production, product spoilage, waste of manpower and steam.

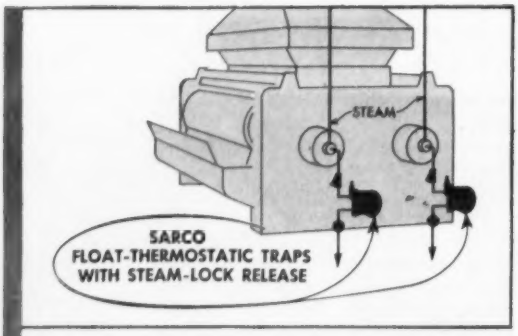
See (right) how simply and inexpensively these troubles have been cured by Sarco products and know-how. Tell us about *your* problems and we'll be happy to put our 43 years of experience to work for you. Just call your nearest Sarco representative, or write Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.

SARCO

improves product quality and output

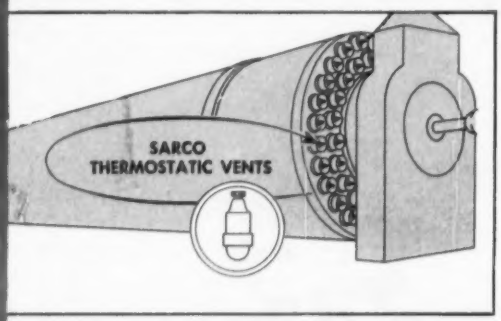
2101-B

Sarco has a wealth of helpful information on trapping, air venting and temperature control. Tell us about your problem – we'll be glad to send you this information and case history solutions to problems similar to yours.



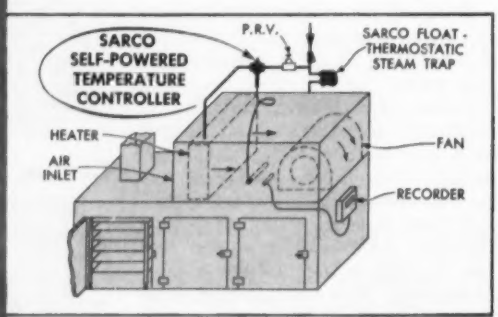
SPOTTY DRYING ELIMINATED: This atmospheric double drum dryer periodically waterlogged because of steam-lock in syphon pipe. Cold spots on drum surfaces, uneven drying and production slow-downs resulted.

By simply replacing the original traps with Sarco Float-Thermostatic Traps equipped with built-in steam-lock release valves... these drying troubles were completely eliminated.



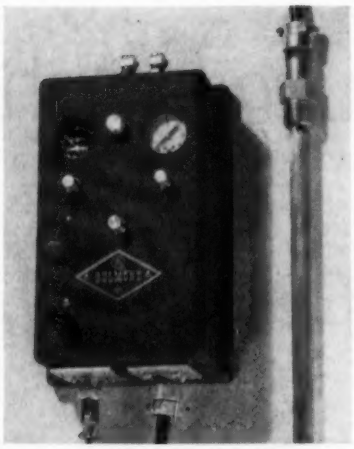
CURE FOR SLOW WARM-UP: When air gets into steam spaces of a dryer it forms a heat-insulating film between the steam and heat-transfer surfaces... efficient transfer of heat from steam is impossible. Result: slow warm-up; prolonged drying time.

Simple, inexpensive cure for this condition are Sarco Air Vents, such as installed on above rotary steam tube dryer.



TEMPERATURE PROBLEMS SOLVED: Manipulating steam valves to control temperature wastes manpower and steam... is often the cause of product spoilage.

Sarco Self-Powered Temperature Controllers, as on this tray dryer, solve this problem ...hold dryer at maximum temperature without danger of overheating. Inexpensive, simple and dependable.



Control Valves Actuated By Level-Sensing Unit

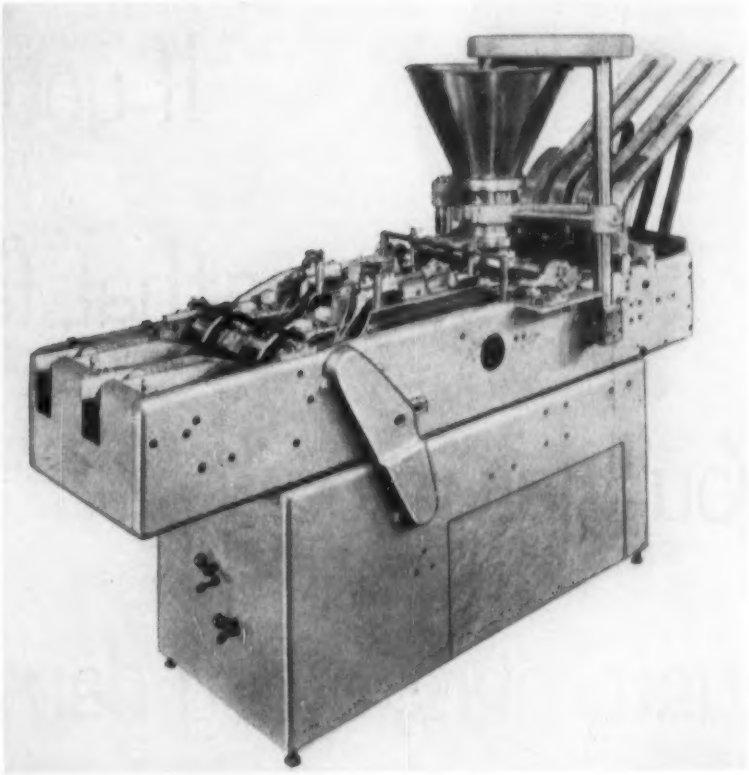
Capacitive level-sensing probe and electronic control, suitable for operating pneumatic-diaphragm valves, are combined in a new model DP level control.

Unit is recommended for such products as milk, oils, refrigerants, and all condensed gases over a temperature range from +500 to −425 F. Control gets a sensing signal from an inert capacitive-type probe applicable to high vacuum operation or pressures as great as 100,000 psi. Probe is connected by coaxial cable to the electronic circuit, which can be located as far as 1,000 ft. from the sensing point.

Responding to a rising or falling level around the probe, the electronic unit actuates an air-pilot valve that modulates a 15-psi. air supply over a range from 3 to 15 psi. This pneumatic signal can be used directly to actuate small control valves or, where greater volumes of air are necessary, can be fed into auxiliary control equipment. Units can be supplied for operation such that the main valve either opens or closes with increased pressure.

Housed in a sturdy industrial-type cast-aluminum box 6½ by 11½ by 4 in., control unit includes a meter for checking its output, and an air-pressure indicating instrument for observing valve operation. Panel-front controls located under screw-on dust-protective caps provide for coarse level adjustment, fine level adjustment, and differential in range of control (proportional-band adjustment). Complete instrument packed for shipment weighs 18 lb.—*Thermo Instruments Co., 1310 County Road, Belmont, Calif.*

Circle 129A on Reader Service Card



Compact Unit Forms Cookie Sandwiches at High Speed

Twin line, completely automatic method of making cookie or cracker sandwiches is the outstanding feature of this new sandwiching machine.

New unit called model GT, operating at speeds in excess of 1,100 per min., reportedly eases processing and packaging of sandwich-type items. Furthermore, it requires a minimum of floor space.

Machine fills cookie or cracker wafers with cream, cheese, or peanut butter, then "claps" them together. Finished sandwiches move onto the package line with goods in position for easy pick-up.

Sandwicher handles a wide variety of shapes and sizes by means of simple adjustments, and no expensive change parts are required.—*Peters Machinery Co., 4700 N. Ravenswood Ave., Chicago 40.*

Circle 129B on Reader Service Card

New Pumpkin Loader Proves Highly Efficient

Machine loading of pumpkin, said to be new to the canning branch, reportedly permits faster and more economical operation. Accomplishing this is a new unit that has a rated capacity of 10 tons per hr.

If you use Peach Flavor that fades away,

You'll lose good customers, every day.

NORDA Flavors don't fade out,

So... always come to NORDA

Old customers won't keep coming—they'll just fade away, if the flavor you put in your product turns tasteless by the time it's eaten. Use Norda Flavors. They stay true. They pay you. Get *free samples* by sending your business letterhead.

Use a Norda "Favorite to Flavor It"

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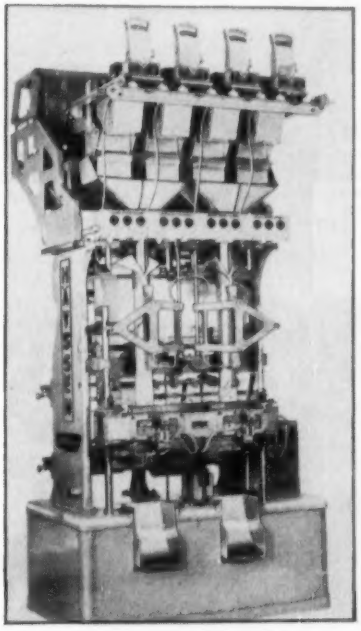
This MP model, similar to loaders used for peas and lima beans, is power-take-off operated and pulled by a 2- or 3-plow tractor. Pickup is done by a gripping action that is controlled for minimum crop damage. This carries the pumpkin onto a conveyor, while weeds and vines are left behind.

Pickup with the loader is done from windrows, preferably 9 to 12 ft. apart. These dimensions prevent the wheels of the tractor-loader combination and the truck or wagon from running over the rows.—*H. D. Hume Co., Mendota, Ill.*

Circle 129C on Reader Service Card



New Packager Features Single-Cycle Operation

Increased flexibility and a complete packaging sequence incorporated in a single machine are advantages cited for a new unit that—

1. Automatically forms, fills, and hermetically seals packages with each cycle—at rates up to 150 per min. 2. Accommodates a large variety of products—solids, powders, liquids, and semi-liquids. 3. Has a wide packaging size range—from ¾ in. wide x 2½ in. long to 7⅛ in. wide x 14 in. long—and employs a simple hand crank package length adjustment. 4. Handles all heat-sealing packaging materials and their laminations.

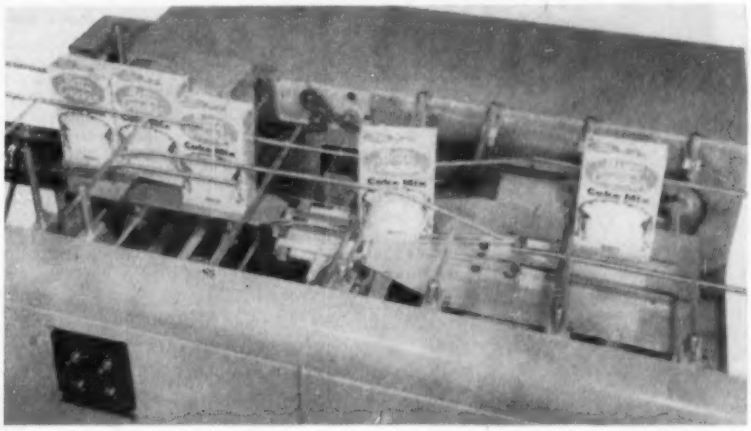
Heavy-duty scale feed on this Model F unit is provided with separate individually operated bulk and dribble feeds. Varying the dribble troughs allows accuracy to ⅛ oz. on small uniform products, and to one piece on larger items. For liquid filling, improved volumetric auger and pump feeds are available so that all types of products may be handled.

Multiple filling and sealing of packages in the range of 2¾ in. wide x 8 in. long is accomplished by incorporating four filling and sealing mandrels in the machine. A self-locking poise mounted on the scale beam permits instantaneous and permanent setting for zeroing each balance. And clear indicators give constant visual check of each scale's accuracy while complete unit is operating.

Other features: Draw-bar counterbalance that equalizes weight of front draw-bar, relieving power overload otherwise produced; heavy-duty drive assembly with all gears, cams, and pulleys secured to their shafts by taper-locked bushings; all self-aligned sealed ball bearing units; electronically controlled over-center linkage that locks sealing die when making end seal; single-blade cutoff with counter-spring safety device; and centralized electric timers that allow all sequences to operate from separate chain-driven switches for positive accuracy and reduced down time.

All controls are within easy reach of operator, and this low-frame machine requires only 3½ ft. x 5 ft. of floor space. Maximum height to top of hopper is 6 to 7 ft., depending on style of feed.—*Hayssen Mfg. Co., Sheboygan, Wis.*

Circle 131A on Reader Service Card



Checkweigher Combines High Accuracy and Speed

Seen cutting waste and speeding production on continuous packaging lines is a new automatic checkweigher, called Model CWA.

Unit is designed to detect a preselected weight differential of ±1/60 oz. in a normal weight range of ½ oz. to 10 lb. Off-weight containers are automatically rejected at speeds up to 130 per min., depending on product container, shape, and size.

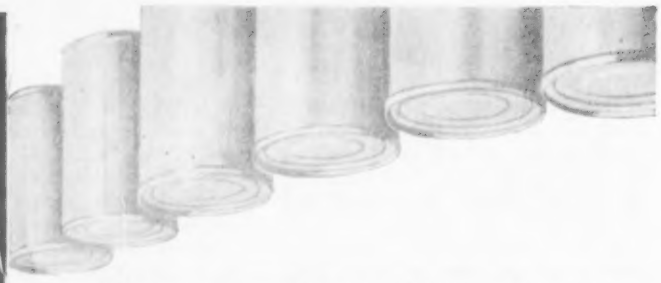
Packages up to 4½ in. x 7¾ in. base size, and cans or glass up to 5⅛ in. dia. can be accommodated. Cartons are handled with a pusher-type loader, while cans or jars employ a worm-type device.

Operating cycle is simple and incorporates a minimum of movement. Containers are fed to a dead plate, then drop ⅛ in. before moving onto the scale. This enables a high-speed flight bar to engage the container at the feed end and move it to the scale. Weighing is completed as the flight bar recedes momentarily, then re-contacts the package to take it off the scale.

After checkweighing, packages advance rapidly to segregating lines. Those correctly filled pass directly to the next machine, but overweighs and underweighs are automatically bypassed. Deflector fingers send these packages to parallel conveyors for reprocessing. Two- or three-way segregation is possible, depending on container dimensions. And the system is provided with green and red lights that indicate over and under containers as they pass through the machine.

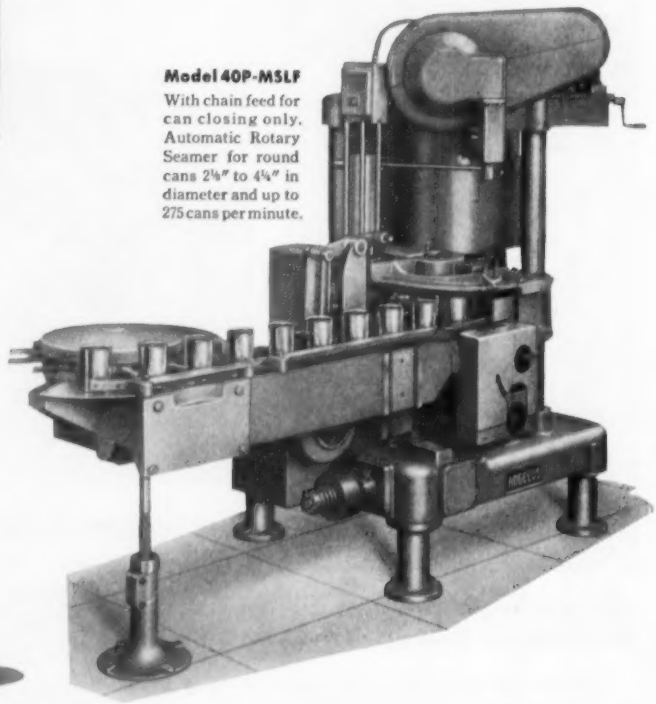
Working in conjunction with the controlled-motion scale is a sensitive weighing mechanism. It uses a simplified, instantly interchangeable plug-in type electrical unit. To reduce product spillage and its effect on scale accuracy, the container rests on bars during weighing. Furthermore, differential weight adjustment is easily made

cut costs with Angelus Seamers

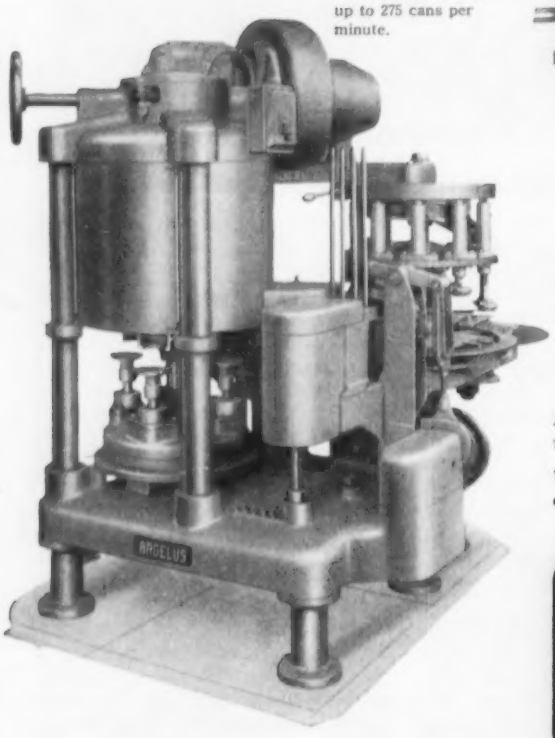


More canners and can manufacturers throughout the world are switching to Angelus Seamers for greater production economies, lower investment costs and minimum maintenance. Angelus Seamers, the products of more than 40 years of experience in developing and manufacturing, are the ultimate in simplified, rugged, efficient design.

Model 40P-MSLF
With chain feed for can closing only. Automatic Rotary Seamer for round cans 2⅛″ to 4¼″ in diameter and up to 275 cans per minute.



Model 40P-DF
For can closing and can making. Automatic Rotary Seamer with disc feed for round cans 2⅛″ to 4¼″ in diameter and up to 275 cans per minute.



Investigate the advantages of low cost production, low cost investment, and low cost maintenance with Angelus Automatic Seamers.

Write today for complete details on models and an Angelus Engineered Application Recommendation.

ANGELUS

Sanitary Can Machine Company
Cable Address "Angelmaco" Western Union Code
4900 Pacific Boulevard • Los Angeles 58, Calif.

by moving a weight on the scale beam.

Checkweigher is easily accessible for fast cleanup and maintenance. In addition, a dust drawer is provided to catch any material that might drop from the containers as they pass through the machine.—*Bartlet Engineering Co., Rockford, Ill.*

Circle 131B on Reader Service Card

Automatic Freezer Doors Minimize Heat Transfer

Costly refrigeration loss reportedly may be cut with use of a new electrically operated automatic refrigerator door, designed for all types of cold storage.

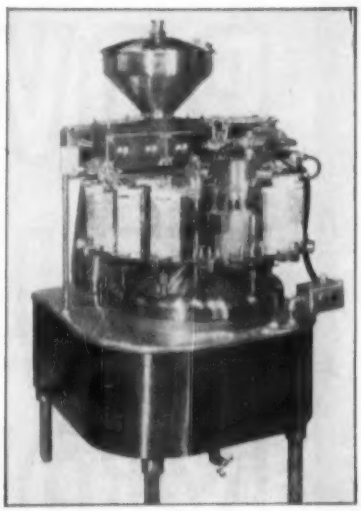
Known as Prest-O-Matic and termed ideal for frozen food lockers and refrigerated compartments, these units employ Fiberglas insulation to minimize heat transfer. In addition, rubber sealing gaskets provide tight closure.

Maker attributes the door's high efficiency to: (1) Faster operation, which results in shorter open-door time for passage of in and out traffic; (2) elimination of suction which develops with swinging doors; (3) character and amount of insulation; and (4) snug seal of doors when closed.

Doors open or close in 3 to 4 sec. in normal size openings—averaging less than 10 sec. for the passage of lift trucks. Although all standard types of control are available, manufacturer usually recommends approach pull cord or push buttons. These devices do not require the truck operator to leave his vehicle or even stop to actuate the doors.

Freezer doors are offered as complete packaged units, including motor operator, frame, insulated door sections, all hardware and controls. And these units can be quickly and easily installed by maintenance mechanics.—*Clark Door Co., 504 Hunterdon St., Newark, N. J.*

Circle 133A on Reader Service Card



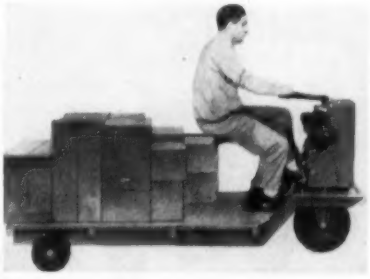
Plastic-Coated Containers for Small Dairies

Designed specifically for the new Sealking plastic-coated, set-up containers (Sealright Co., Fulton, N. Y.), these fillers now enable the small dairy to enter the "paper" milk market. With only one operator, they handle all sizes of cartons—from ½ pt. to twin-quart ½ gal.

Model R-1 (left), a semi-automatic machine, accurately fills and seals 8-10 quart cartons per minute in a simple operation. The R-4 (right) has a production rate of 20-24 qt. per min. With this unit, opening, filling, sealing, and dating are fully automatic. And a steam jet defoamer assures a clean package.

Changeover from one size carton to another and wash-up are said to be quick and easy with either filler. Both are constructed of stainless steel, nickel alloy, and anodized aluminum, and are designed to pass all local health board inspections.—*Triangle Package Machinery Co., 6635-55 W. Diversey Blvd., Chicago, 35.*

Circle 133B on Reader Service Card



Light Platform Truck For Many Purposes

Designed primarily for multi-purpose hauling of loads up to 1,500 lb., this motor-driven platform truck is cited as well suited to mixed-load horizontal transportation, and can complement fork-lift trucks.

Known as Multiton-Excelsior, it has a low platform that is less than 12 in. from the floor and measures 69 in. long by 38 in. wide. A single-cylinder engine drives the front wheel through a three-speed gear box. And the entire power unit, composed of motor and gear box, swivels through 360 deg. so that all gear ratios are available in forward and reverse motions. Transmission, from motor to gear box and from gear box to front wheel, is by roller chain.

Operator normally is seated, but he can also control the truck from a walking position, since the steering tiller can be swung backward or forward, over the motor. This three-wheeled, pneumatic-tired vehicle is termed very economical to operate, since its unladen weight is less than 370 lb.

And despite unit's design simplicity, no essential operating or safety control is omitted.

Furthermore, the low platform body is easily converted to varied specialized uses, such as personnel carrying or outfitting, as an intraplant plumber's, electrician's, or mechanic's truck, or for outdoor use.—*Stokvis-Edera & Co., 18 Secatoag Ave., Port Washington, N. Y.*

Circle 133C on Reader Service Card

POWELL VALVES . . . THE COMPLETE QUALITY LINE . . . POWELL VALVES

POWELL VALVES FOR MODERN INDUSTRY

FIG. 2193—Ni-Resist* Gate Valve for 200 Pounds W.O.G.

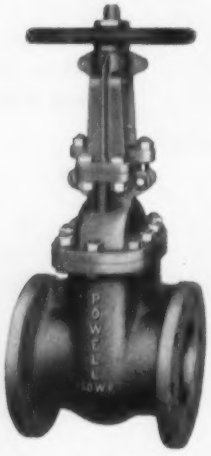
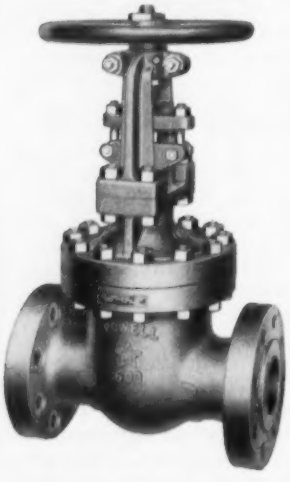


FIG. 2453 G—Stainless Steel O.S.&Y. Gate Valve for 150 Pounds W.P.

FIG. 6003 SS—Alloy Steel Gate Valve for 600 Pounds W.S.P.



*Trademark of The International Nickel Co.

POWELL VALVES . . . THE COMPLETE QUALITY LINE . . . POWELL VALVES

When you think of valves—think of Powell. For Powell has a *complete* quality line. Powell probably makes more kinds of valves and has solved more valve problems than any other organization in the world.

Shown above are just a few Powell Valves. Investigate these valves . . . *and* the *complete* line of quality valves made of bronze, iron, steel, special alloys and pure metals.

Consult your Powell Valve distributor. If none is near you, we'll be pleased to tell you about our complete line, and help solve any flow control problem you may have. Write . . .

The Wm. Powell Company, Cincinnati 22, Ohio . . . . . 109th year

All-Electronic Converter Has High Sensitivity

A new thermocouple-air converter, for use with thermocouples or other low voltage d.c. inputs, offers all-electronic process control while permitting retention of pneumatic recording and controlling panel components.

Designated as Type T3C, it consists of two main sections. Upper section is an amplifier-converter, and the lower is an electro-pneumatic transducer. Latter is of the null-balance type in which a magnetic force is balanced against the force produced by air pressure from a pneumatic pilot.

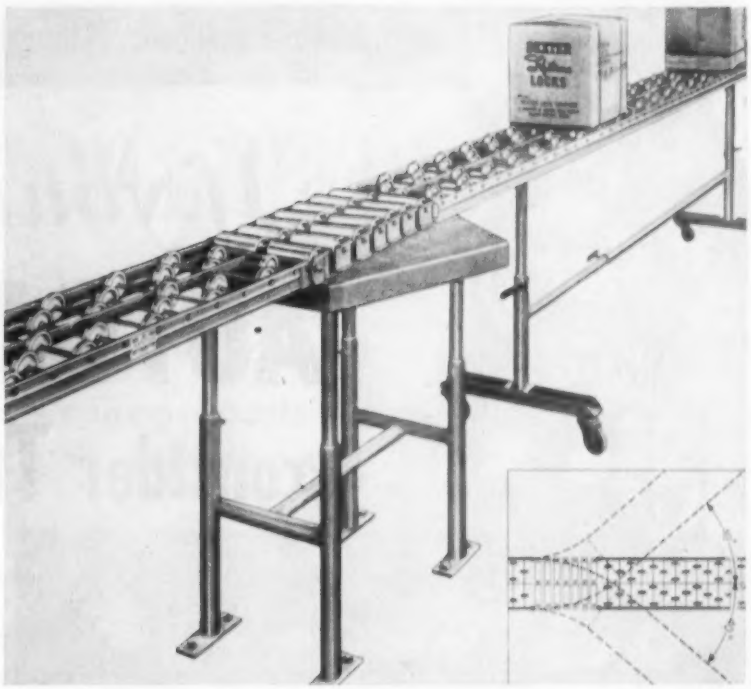
A high-impedance unit which does not draw current from the thermocouple, this device converts d.c. millivolt input signals to an air loading pressure of 3-15 psig. in an accurate linear relationship. There are no batteries, slide wires, or motors, thus minimum maintenance is required for the unit.

Resolution is high. Wide spectrum of standard temperatures ranges from —50 C. to a maximum of 3,000 F. Span is 2-50 millivolts, span accuracy 1%, reproducibility ½% of span, and ultimate sensitivity is better than .01% of span.

Furthermore, range is quickly and easily altered by interchangeable range cards.

Unit can easily be mounted on any vertical surface. And the electro-pneumatic transducer can be furnished in an explosion-proof housing. Therefore, final conversion to pneumatic output may be in a hazardous area remote from the amplifier. Overall dimensions are 7 in. wide, 17½ in. high, and 4½ in. deep.—*Swartout Co., 18511 Euclid Ave., Cleveland 12.*

Circle 135A on Reader Service Card



Flexible Conveyor Section Speeds Dock Loading

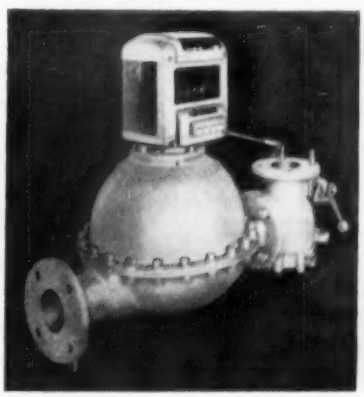
Spotting orders on a loading dock is sped and simplified with use of a new conveyor component which is flexibly attached to the end of an existing conveyor.

Designated as Flex-A-Tail, it employs a permanently mounted joint comprising a flexible assembly of split rollers. These are mounted in individual frames and move on a stationary slider bed. Attached to this unit is a 5-ft. portable tail section of wheel or roller gravity conveyor. And other lengths up to 25 ft. are available.

In operation, unit is mounted with its receiving end attached to the discharge end of the shipping room conveyor. Tail section then extends onto the loading dock where it can be moved through an 80-deg. arc (40 deg. right and left from the through position) without use of any conventional switching equipment. With the tail set at any angle in the arc, goods can be removed at any point along its length and stacked for shipping over a large dock area.

Unit is available in 11½, 15, and 18 in. widths in wheel or roller models. Couplings for attaching to standard gravity conveyors are also furnished when required.—*Metzgar Conveyor Co., 493 Douglas St., Northwest, Grand Rapids 4, Mich.*

Circle 135B on Reader Service Card



Automatic Meter Handles Flow Up To 300 GPH

Automatic control of water, syrups, oils, and other liquid ingredients fed to batching and blending processes is now extended to rates of flow as high as 300 gpm. with this new 3 in. Auto-Stop meter.

New unit features a double-trip or "cushioned" valve that slows down rapid flow of liquid an instant before it trips shut. This permits accurate cut-off with no hydraulic hammer.

To operate, tripping mechanism on register is first set by pushing buttons

If your aim is AUTOMATION consider Transwrap

Automation in your packaging department can bring you great savings—and the TRANSWRAP is automation indeed!

You can feed your product to this machine either automatically or manually, depending on your production methods. From that point the Transwrap takes over completely.

Transwrap measures the sales unit of the product by volume or weight. Simultaneously it forms the package from roll material, fills, seals and delivers it ready for packing.

The product can be solid, granular, powder, liquid or semi-liquid. The package can be formed from any heat-sealing material, including laminated foil. The machine will imprint automatically. You can use plain or printed material which is accurately registered as the package is formed. One operator can supervise three Transwraps in production.

GREATER PRODUCT PROTECTION

A Transwrap package is *hermetically sealed,* and can be gas filled in the packaging process. Your product, therefore, stays fresh—is enjoyed at the peak of perfection.

Illustrated folder sent on request.

PACKAGE MACHINERY COMPANY
SPRINGFIELD, MASSACHUSETTS

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ATLANTA DALLAS DENVER LOS ANGELES SAN FRANCISCO
SEATTLE TORONTO MEXICO, D.F.

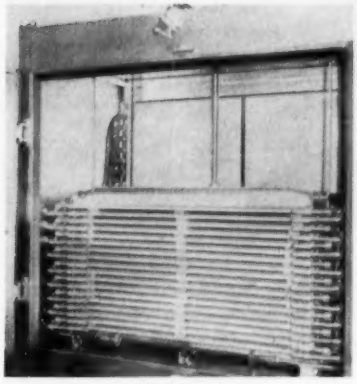
SEE US AT THE PACKAGING SHOW...BOOTH 1105

on bottom of register until number of gallons or pounds required by formula shows up on setting wheels in little window just above buttons. Main numerals are then cleared back to zero by turning-re-set handle on right side of register. After opening valve, operator is completely free to devote full attention to other duties. Meter automatically cuts off flow when exact quantity of liquid is delivered.

Large numerals on face of meter keep pace with flow, and provide a visual check when delivery is finished. Flow can be stopped instantly at any time by pressing emergency stop button. This does not affect meter reading or setting. Delivery can be continued to its conclusion by reopening valve, or register can be reset for a new quantity before continuing.

Meter is of positive displacement, nutating piston type, with an excellent record for sustained accuracy.—*Neptune Meter Co., 19 W. 50th St., New York City.*

Circle 135C on Reader Service Card



Compact Package Freezer Has High Efficiency

Quick, even, and low-cost freezing of packaged foods are advantages cited for a portable contact-type freezer that occupies a space of 8x5¼x7¾ ft. and does not require fans or a cold room.

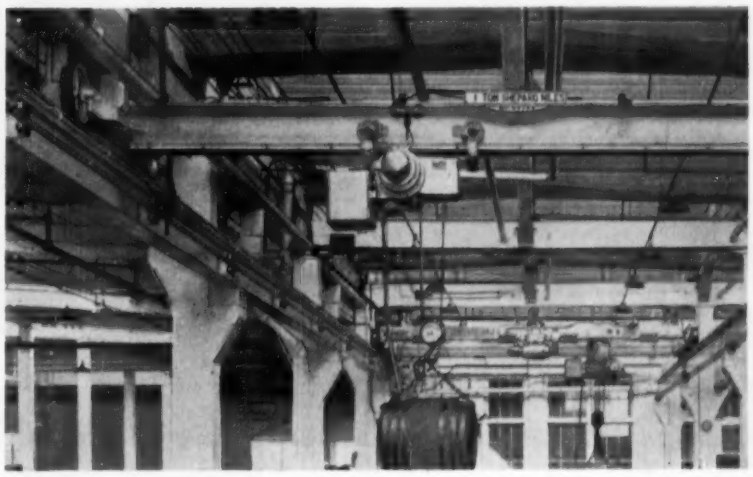
Known as Articold, it is suitable for use at packing lines or loading docks, and may also be transferred from plant to plant to meet seasonal requirements. Consumer and institutional-size cartons are handled at hourly rates up to 1,280 lb. for fruits and vegetables, and 1,800 lb. for meat and fish, including handling time.

Unit is constructed of corrosion-proof metals. It is equipped with 4-way hydraulic control valves and a 6-ft. double-acting hydraulic cylinder for lowering and raising freezing plates.

SHEPARD NILES Crane

OVERHEAD PASS

speeds loads there thru-the-air



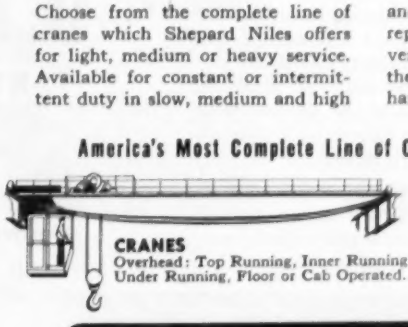
Put your handling where it belongs

. . . OVERHEAD where it's out of the way! By using a Shepard Niles Crane, you free floor space for production and storage, move loads quickly, safely, at low cost.

Choose from the complete line of cranes which Shepard Niles offers for light, medium or heavy service. Available for constant or intermittent duty in slow, medium and high speeds . . .operated from pulpit, cab or floor. Featuring component parts designed and built by Shepard Niles expressly for crane service.

Write for latest Crane Bulletin . . . and arrange to have a Shepard Niles representative call at your convenience. He'll assist you in selecting the crane that meets your load-handling requirements.

America's Most Complete Line of Cranes and Hoists since 1903



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Overhead: Top Running, Inner Running Under Running, Floor or Cab Operated.

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Operated from Cab, Floor or Pulpit.

SHEPARD NILES
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1267 Schuyler Ave., Montour Falls, N.Y.

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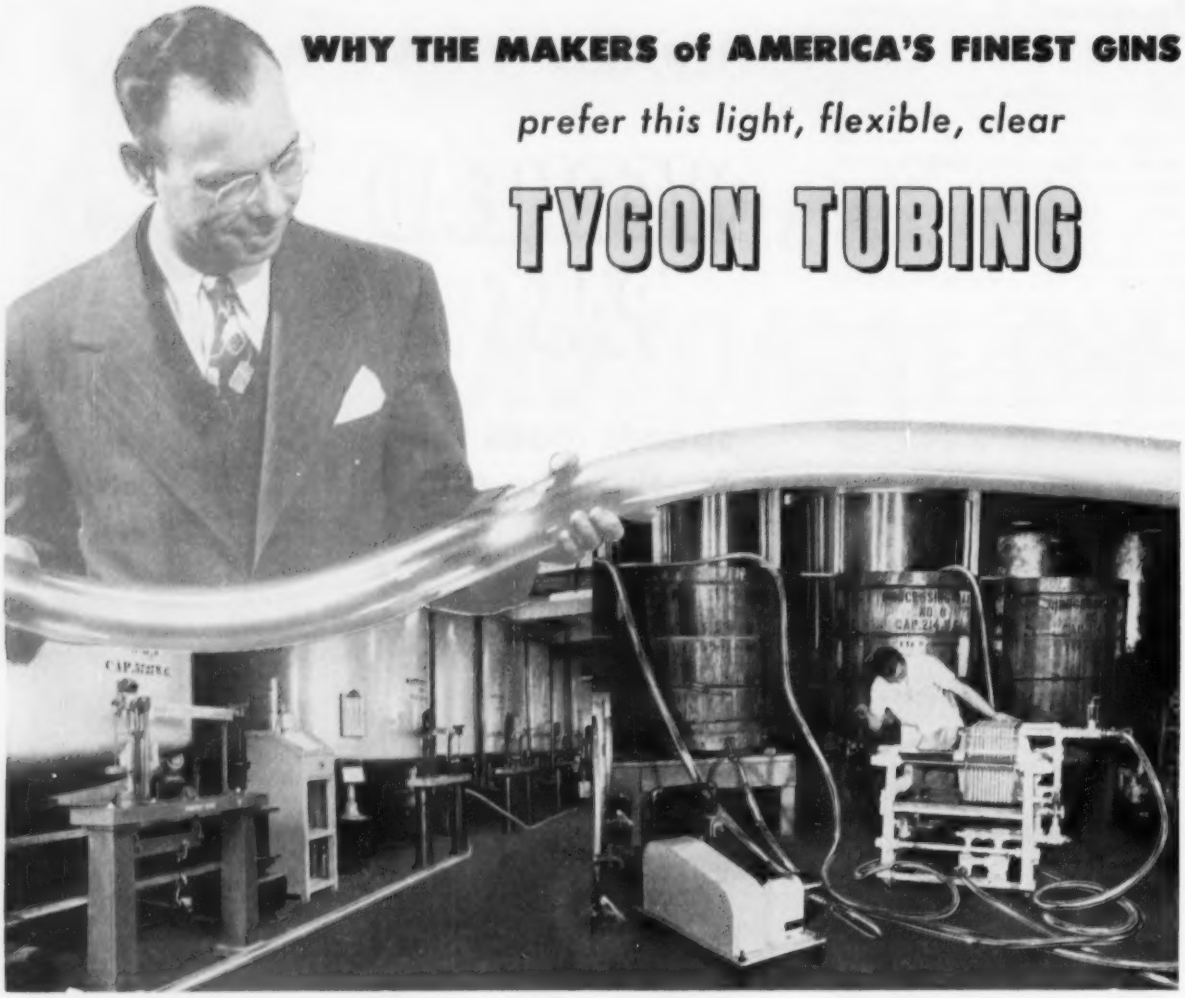
WHY THE MAKERS of AMERICA'S FINEST GINS

prefer this light, flexible, clear

TYGON TUBING



The problem of transporting water white gin from bottling tank to bottling machine was long a headache to its makers. The piping had to be flexible to permit the use of portable pumps. Rubber hose began to show signs of deterioration under the action of the alcohol within a few months. Particles of rubber would flake loose to show up only after the gin was bottled in clear glass. And rejections are costly.

Tygon plastic Tubing solved this problem as it solves many problems in safe transport of foods and beverages. Tygon is unaffected by food acids or by alcohols. It is glass clear, enables inspection to spot any foreign matter all along the line. Tygon's light weight appeals to the worker. It is easily handled. Easy to connect and disconnect. It is tough and sturdy, takes floor abrasion in its stride.

And, of course, of first importance to any manufacturer of food products, Tygon Tubing will not contaminate or affect the most delicate food products. It is completely non-toxic, completely safe to use. It can be sterilized. Its polished interior surface facilitates cleaning and its glass clearness automatically sets up high standards of cleanliness.

PRODUCT OF

U.S. STONEWARE

Plastics and Synthetics Division

74E

Tygon Tubing Formulation B 44-3 should be specified for food and beverage use. Bulletin T-87 describes Tygon Tubing formulations, gives full technical detail, physical and chemical characteristics. Write for it today. Address Dept. FE355_____Plastics and Synthetics Division, The U. S. Stoneware Co., Akron 9, Ohio.

Equipment & Supplies

Freezing stations, which vary from 8 to 20 in number, are formed by these horizontal plates in which refrigerant is circulated or evaporated.

In operation, trays of packaged food are placed on the plates which measure 44x69 in. Then the hydraulic cylinder lowers them to a predetermined setting so that bottoms of plates make direct contact with tops of cartons. Precise contact of plates and cartons assures quick, even freezing and a flat, uniform package for maximum casing efficiency.

Furthermore, the unit's quick-freeze principle (refrigerant is at −35 F.) aids in retaining product quality.—*Food Machinery & Chemical Corp., P. O. Box 1120, San Jose 8, Calif.*

Circle 137A on Reader Service Card

Portable Vacuum Cleaner Is Explosion Proof

Safe mechanized cleaning in mills, grain elevators, or other hazardous areas, is the outstanding feature of a new portable industrial vacuum cleaner. Its ⅞ hp. motor and all electrical fittings are safety designed to be proof against fire or explosion.

This unit is reported suitable for cleaning floors, walls, overhead pipes, machinery, or stock bins where grease, chemicals, or other flamable materials are present. And maker states that it may safely be used in the presence of explosive gases, vapors, or dust.

Because it works equally well for wet or dry pickup, the cleaner may also be used to remove combustible material from storage tanks.—*Multi-Clean Products, 2277 Ford Parkway, St. Paul, Minn.*

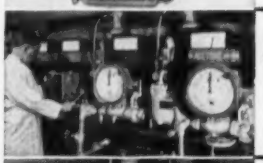
Circle 139A on Reader Service Card

√ Are you saving all you can with Liquid Meters?

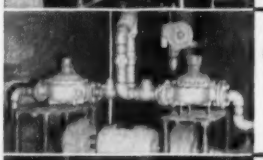
Here's a check-list of savings made every day with accurate metered measurement of more than 150 industrial liquids. Chances are you can use at least five of these ideas in *your* plant:

✓ **AUTOMATIC BATCH MIXING:** Meter liquids directly to tanks or kettles with Neptune Auto-Stops. Push buttons to set quantity . . . meter cuts off accurately, automatically. No waiting for weigh tanks to fill, no "inching" up to gauge marks, no wrestling with bags or buckets.

✓ **AUTOMATIC PROCESS CYCLING:** Auto-Stop meters can be equipped with electrical switches to start or stop pumps, agitators, etc. . . . automatically. Saves times, labor, power . . . with closer control.

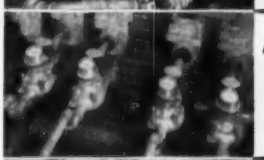


✓ **ELIMINATE REJECTED BATCHES:** In one leading pharmaceutical plant, Neptune meters eliminated human errors, saved enough costly ingredients to pay for the meters in less than a month! How's *your* "reject" rate?



✓ **EASIER INVENTORY, COST CONTROL:** Neptune Meters at key check points keep track of inventory, interdepartmental use, production rates, etc. They put a stop to waste, verify full measure received or delivered.

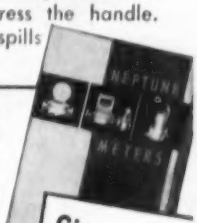
✓ **AUTOMATIC DRUM FILLING:** This Neptune fills drums, radiators, fuel tanks, etc., with exact quantity every time you press the handle. Saves time, labor, prevents spills or "shorts."



✓ **OIL BURNERS, DIESELS:** Use these low-flow meters instead of bulky day tanks to measure fuel consumed by boilers, melting furnaces, diesels, etc.

✓ **WATER CONDITIONERS:** Trident meter's wary eye tells when ion exchange unit needs recycling. See if yours has trouble-free Trident.

✓ **TANK TRUCK DELIVERIES:** Many industrial liquids can be delivered by metered trucks with greater ease and accuracy than markers, gauges or sticks. Investigate Red Seal meters.



Give you any ideas?

TELEPHONE OR WRITE NEAREST NEPTUNE BRANCH OFFICE FOR QUICK DETAILS—

Or write for Metering Data Book 566-RF

NEPTUNE METER COMPANY
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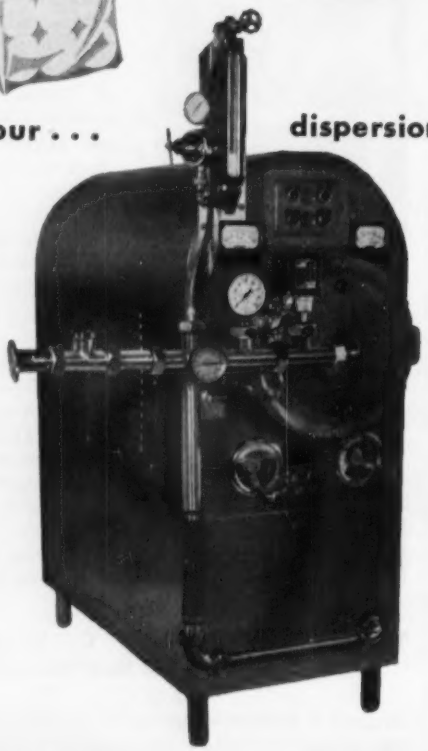
All these products from an Oakes Continuous Automatic Mixer!

Pound Cake

Angel Food Cake

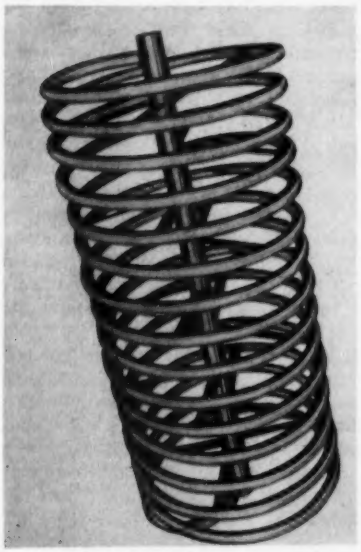
Here's the solution to your . . . dispersion and mixing problems!

Whether your problem involves simple mixing, or difficult dispersion with extreme stability and uniformity, the Oakes Continuous Automatic Mixer offers a solution. For example, the products pictured show only to a limited extent the types of mixing and dispersion of which the Oakes mixer is capable. In product after product, and industry after industry, installation of Oakes mixers has resulted in a sensational lowering of production costs and improvement in quality.



If you have a mixing or dispersion problem including or excluding aeration, or are interested in reducing costs and obtaining improved and uniform quality, or wish to increase production, or are dissatisfied with the results you presently are obtaining, we invite you to consult with us. We shall be glad to study the problem in the light of our experience with a great variety of food and other products, and indicate the results that might be expected for your product with an Oakes Continuous Automatic Mixer.

The E. T. OAKES Corporation ISLIP, L. I., NEW YORK



Heating Coil Features Integral Agitators

Recommended for applications such as sugar refining, oleo blending, and processing of dairy products is a new coil designed for fast heating and simultaneous mixing.

Coil has an integral hollow shaft fitted with flat spokes that act as paddles. Steam is carried through the shaft to the coils, while action of the paddles promotes heat transfer.

Unit is made entirely of stainless steel for use with acidic or otherwise corrosive foods.—*Remple Co., 340 N. Sacramento Blvd., Chicago 12.*

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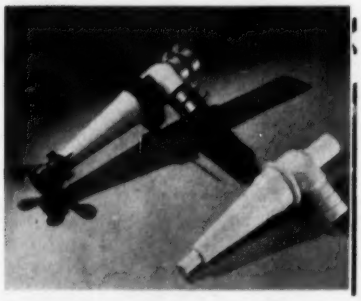


Food Applications Seen For New Wet Cyclone

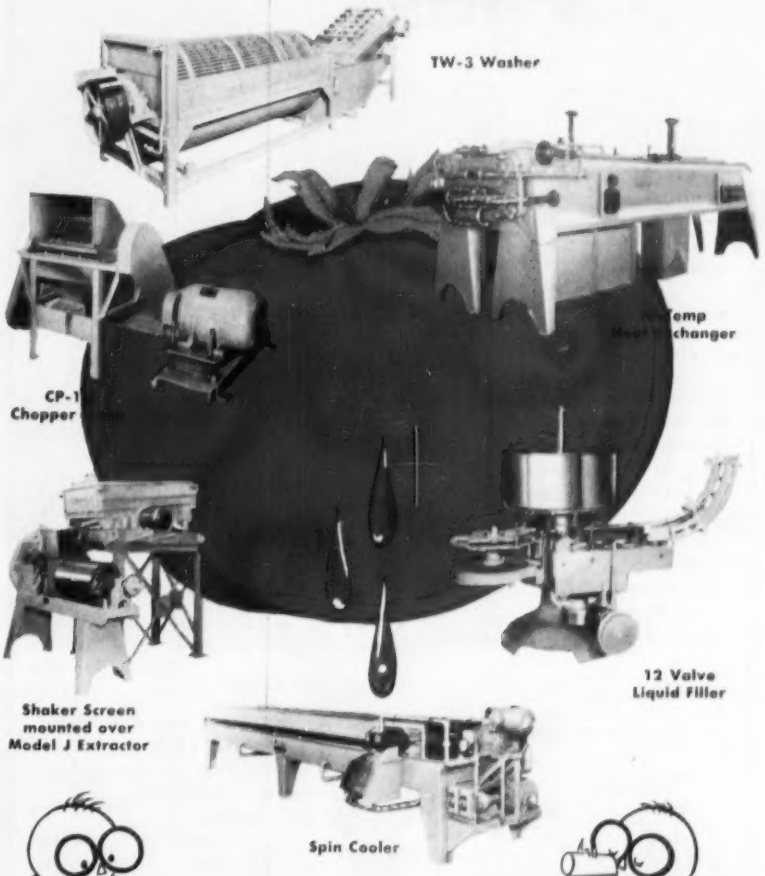
Sanitary features, as well as operating characteristics, are said to make this recently developed wet cyclone particularly well adapted to food processing.

Called P50 DorrClone, unit is capable of all non-abrasive fine classification operations in the 10-20 micron

For Quality and Economy

COMPLETE TOMATO JUICE LINE

by **CRCO** "SAY "SEE-AR-CO"



FROM RAW PRODUCT...
...TO FILLED CONTAINER
you get fast, sanitary and economical processing every step of the way.

Every piece of equipment in CRCO's Complete Tomato Juice Line is engineered to process better, cleaner and faster. They add up to more profit for you. Write for complete data.

THE BEST OF Everything

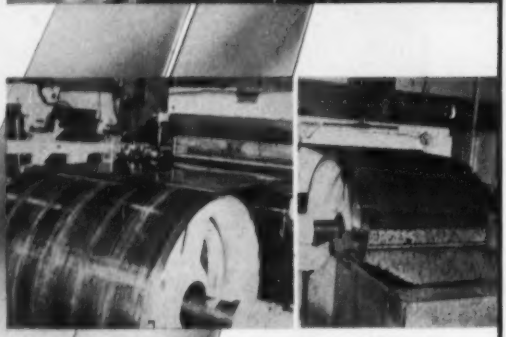
CHISHOLM-RYDER CO. INC.
Niagara Falls, New York
FOR THE FOOD PROCESSOR

For more information, use coupon on last page

A CONVEYOR BELT OF SOLID STEEL

is behind these Sandvik service records

Over 150 million cans of Hershey's chocolate syrup have been carried by this Sandvik steel belt conveyor.



More than 8 years of round-the-clock unattended operation is the performance to date of this Sandvik steel belt conveyor being used in producing Nestle's Semi-Sweet Chocolate Morsels at Fulton, N. Y.

Sandvik belts used for similar applications in other companies have been operating successfully for over 15 years.

Here are two samples of the kind of long-lived, trouble-free conveying you can get from a Sandvik steel belt conveyor.

In addition to inherent stamina, the stainless or carbon steel belt gives you a smooth, flat, tasteless and easy-to-keep-sterile surface.

Sandvik builds complete conveyors for a wide variety of food-handling applications. Belts can be of any length or width.

Write, wire or phone for further information.

SANDVIK STEEL BELT CONVEYORS
Division of Sandvik Steel, Inc.
111 EIGHTH AVENUE, NEW YORK 11, N. Y., WAtkins 9-7180
Branch Office: 230 N. Michigan Ave., Chicago 1, Ill., FRanklin 2-6638
IN CANADA: SANDVIK CANADIAN LTD., 5675 Royalmount Ave., Montreal 16, P.Q.
Manufacturers Of Steel Belt Conveyors For Over 40 Years

SANDVIK STEEL BELT CONVEYORS

55-106

Equipment & Supplies

range. And very important from the sanitation standpoint, its smooth inner surface and absence of sharp edges prevent accumulation of material and subsequent putrefaction. Furthermore, initial cost is low and it is also suited to processes requiring corrosion- or heat-resistant materials of construction.

Cyclone is constructed entirely of porcelain and operates at pressures up to 80 psi. with a maximum flow of 30 gpm. And reducing the pressure to only 5 psi. still permits a flow rate of 7.5 gpm.

In operation, feed and overflow volumes may be adjusted only by varying the operating pressure, while underflow is regulated by a rubber apex valve. With materials that have a specific gravity of 2.7, approximately a 15-micron separation can be achieved.

Unit is about 18-in. long and its 50 mm. cone has a 10-deg. angle. Feed chamber, vortex finder, and cone section are all integral parts of the cast porcelain body, which is completely glazed with the exception of feed and product connections. Equipment includes a steel support ring, rubber-disk apex valve, and hose and clamp for feed and overflow connections.

Cyclone is available in only one standard size—50mm. in dia. Outside diameter of feed and overflow connection is 2 in., and underflow port is 1-in. o.d.—*The Dorr Co., Barry Place, Stamford, Conn.*

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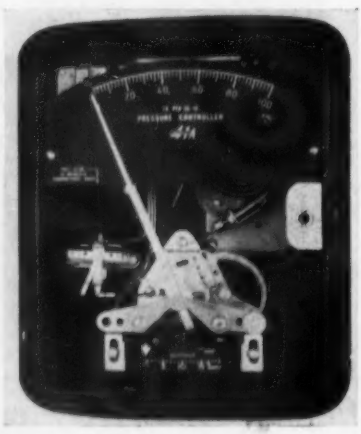


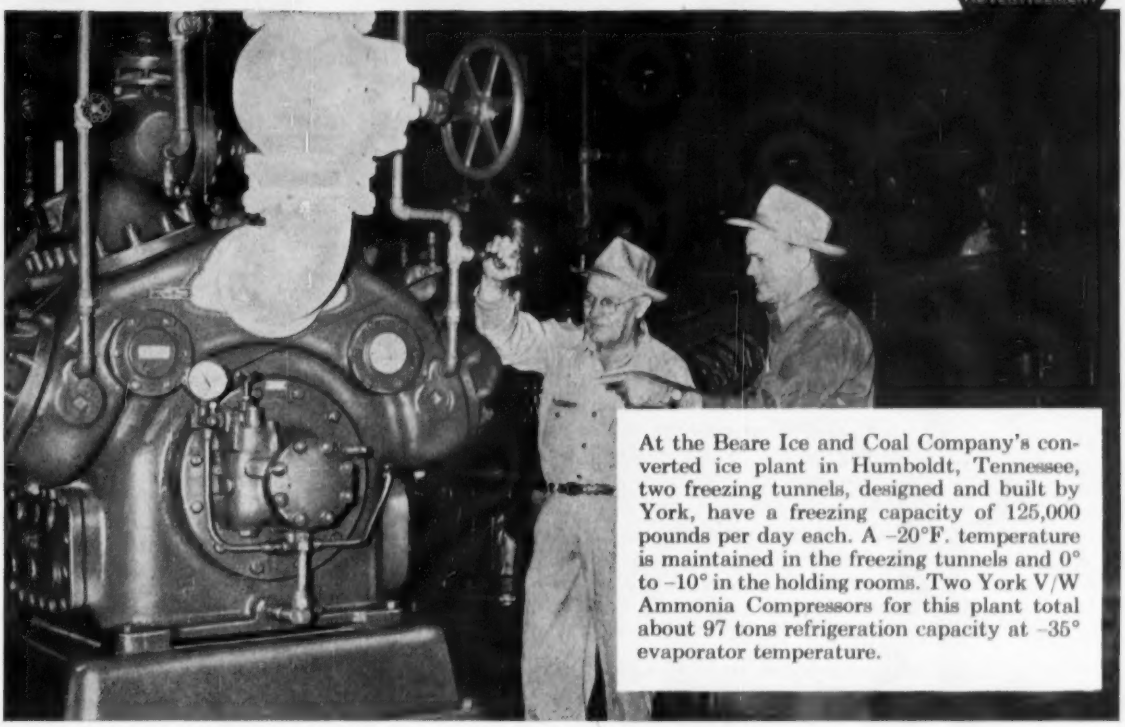
Dual Action Is Featured In Process Controller

Dependable, low-cost control of such variables as temperature, pressure, liquid level, and humidity is offered by a redesigned control instrument that features either sharp on-off or

NEW facts for your files on York V/W Ammonia Compressors for

Quick Freezing Plants

INFORMATION ADVERTISEMENT



At the Beare Ice and Coal Company's converted ice plant in Humboldt, Tennessee, two freezing tunnels, designed and built by York, have a freezing capacity of 125,000 pounds per day each. A –20°F. temperature is maintained in the freezing tunnels and 0° to –10° in the holding rooms. Two York V/W Ammonia Compressors for this plant total about 97 tons refrigeration capacity at –35° evaporator temperature.

FREEZING ROOMS CAN DOUBLE AS HOLDING ROOMS—and refrigerating equipment must fill each need economically. York V/W Refrigerating Compressors offer outstanding flexibility of operation for greater economy.

BIG POWER SAVINGS—Starting power requirements are reduced because compressor starts unloaded. Automatic or manual control of cylinder unloaders provides extreme flexibility. This permits selecting most economical stage of operating capacity to balance changing plant loads. Power requirements are reduced in almost direct proportion to load reductions—28% power at 25% load, for example.

EASY INSTALLATION — Compact, lightweight, balanced design of York V/W Refrigerating Compressors eliminates need for special foundation (requires only a level floor). Freedom from vibration permits upper floor installations.

ENGINEERING SERVICE—York's vast experience in the freezing and storage of foods is part of a *complete* York service available to your design engineer.

Some Helpful Hints for Quick Freeze Men

1. To speed merchandise handling and reduce the loss of refrigerated air from freezing areas, provide pull cords which fork lift truck operators can reach from their seats and which automatically open and close the cold storage doors. Platforms should be designed with sufficient width (approximately 20 ft.) to permit such operation.

2. To assure proper air circulation and uniform low temperatures of frozen foods in cold storage areas, provide air circulation space between pallets and packages and keep packages from contacting walls.

3. Heating coils installed in the lower slab of a concrete floor will prevent frost heaving in freezing and food storage areas. Coils should be kept at approximately 50°F. with automatic thermocouples to control temperatures.

A.I.A. FILE NO. 34-H-4

CUT ALONG THIS LINE AND FILE

CUT OUT AND FILE—SEND FOR FREE FILE FOLDER AND REPRINTS—SEE OTHER SIDE

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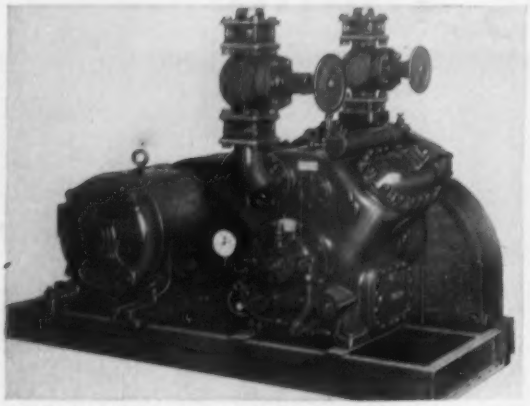
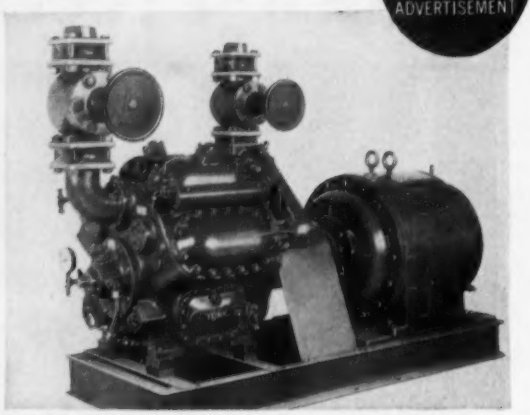
YORK V/W AMMONIA COMPRESSORS

INFORMATION ADVERTISEMENT



4-cylinder V/W Ammonia Compressor (Belt Drive)



8-cylinder V/W Ammonia Compressor (Direct Drive)

York V/W Compressors bring great flexibility of operation to quick freezing plants. Their ability to operate at various stages of capacity realizes important savings on operating costs during off-season periods (when loads are light) and when freezing rooms double as holding rooms (with different temperature requirements for each duty).

TYPICAL DIMENSIONS

V/W—BELT DRIVE—3¾" x 3 "	V/W—DIRECT CONNECTED—3¾" x 3"
Length 69"—76" *(Including motor and depending on model)* Width 39¼"—45" Height 46½"—48½"	Length 75¼"—105 7/16" *(Including motor and depending on model)* Width 30½"—38⅜" Height 48 11/16"—57⅞"

PRINCIPAL FEATURES

FLEXIBILITY OF OPERATION—York V/W Compressors offer various stages of capacity reduction through automatic or manual unloading for greater flexibility of operation. An 8-cylinder V/W Compressor, for example, has 4 stages of capacity reduction.

EASY MAINTENANCE—All wearable parts—including cylinder liners, valves, bearings, oil pumps and unloader power units—can be easily removed and replaced when worn. Thus, prolonged and expensive shutdowns can be avoided, and original operating efficiency is maintained. IT *CAN'T* WEAR OUT.

EASY INSTALLATION—Compact size, extremely low weight per cooling unit and vibration-free operation minimize space requirements and permit easy installation. Even upper floor installations are possible without special foundations.

OPERATION

York V/W Compressors give efficient use as single units in refrigeration systems up to 300 tons capacity and where evaporator temperatures are above -20°F. In quick freezing plants with evaporator temperatures running to -20°F. and lower, it is recommended that a compound compression system be installed with a York Booster Compressor acting as the low-stage compressor. This type of installation will usually justify itself through reduced operating expense and first cost of equipment.

SPECIFICATIONS—STANDARD UNIT

CAPACITY—5 to 300 tons capacity in a single unit.

CYLINDERS—4, 6, 8, 12, or 16 cylinders (depending on model), and arranged in a V, W or VV.

HOUSING—Close grain iron casting with removable cast alloy iron sleeves fitted into cylinders.

CAPACITY REDUCERS—Capacity reducers, including necessary steel tubing orifices and hand-operated stop valves are furnished as standard equipment. Automatic capacity reduction extra.

LUBRICATION—Pressure lubrication for all bearing surfaces from a single pump geared to crankshaft.

SHAFT SEAL—Positive packless type under continuous oil head. Refrigerant can't leak out—air can't leak in. Friction wear at a minimum.

York Corporation, York, Pa.

YORK CORPORATION

the quality name in refrigeration

HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

CUT ALONG THIS LINE AND FILE

the narrrow-band proportional control.

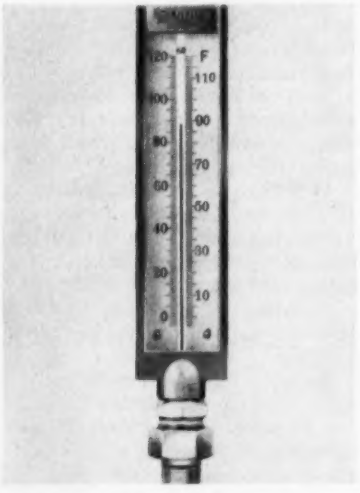
Applications for this pneumatic controller (Model 41A) include economical temperature regulation of such processes as blanching, exhausting, and in-bottle pasteurizing. And as a liquid level device, it is used to control product level in filler bowls.

When set for on-off action, the unit snaps the control valve from fully open to fully closed as the measurement crosses the control point. Thus, it handles any process with large capacity-demand ratio and negligible lag.

And for service requiring throttling action, the controller is equipped with a proportional unit adjustable from ¼% up to 25% of scale. This device is a simplified blast-feedback proportioning mechanism that relies on air jet rather than bellows-actuated "follow-up" action.

For improved readability and accuracy, this new scale has white-on-black numerals, while graduations have been lengthened to 5 in. Although case size is only 11¼ in. x 9 in. x 4¾ in., standard measuring elements are readily accommodated, and internal components are easily accessible for routine maintenance. *The Foxboro Co., Foxboro, Mass.*

Circle 142A on Reader Service Card



Industrial Thermometer Is Easy to Read

This new instrument features a "U" shaped scale that reportedly provides broader calibration area and eliminates distortion of markings and figures.

Styled for reading ease, thermometer has large black markings on a white face and magnified tubing with

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DAY JUMBO MIXERS... meet every requirement imposed by heavy loads. For instance, the standard-duty DAY Jumbo Mixer is equipped with two roller bearings mounted on heavy fabricated supports. Heavy-duty units have an extra outboard bearing to eliminate cantilever action or drift. Air- and grease-seal stuffing boxes and 3-piece, dust-type covers are standard equipment. Agitators have a laminated outer ribbon, continuous welded, ground smooth, with outer ribbon having a relieved trailing edge to eliminate rubbing action. Tanks can be equipped with heating or cooling jackets for 40, 60 or 80 psi. Available in 600- to 3850-gallon capacities. For complete information write for Bulletin 800.

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For more information, use coupon on last page.

you've got low-cost sanitation right in the palm of your hand

No bigger than a pipe bowl, yet the Hozon Unit does a mammoth job of helping to deliver low-cost spray sanitation. This unit, hooked up with an ordinary garden hose, permits regulated amounts of Oakite Bactericide to be sprayed from the hose nozzle. Makes sanitizing walls, floors, equipment—all areas—as simple as watering a lawn.

No higher than a hill of beans, yet this tiny amount of Oakite Bactericide is sufficient to make up a 10 gallon, 100 ppm solution of the best sanitizing agent available. It's Oakite Bactericide . . . with its near neutral pH that permits bug killing within 5 seconds after application. It's Oakite Bactericide . . . that mixes quickly, drains freely, and leaves no films or streaks.

No bulkier than a time-table, yet this handy descriptive folder is chock full of facts on how Bactericide and the Hozon Unit team up to drive spoilage out of your plant. It gives complete details on how the Oakite Hozon Unit works, how solutions are made up, where to use it.

No costlier than a stick of chewing gum. The amount of Bactericide to make up that 10 gallon solution costs *less than one cent.* And here's the big news. The Hozon Unit is FREE to users of Oakite Bactericide and the folder is FREE on request. Write today for the full story on how you have low-cost sanitation . . . right in the palm of your hand. Oakite Products Inc., 26G Rector Street, New York 6, N. Y.

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bright red mercury. Accuracy is assured by calibrating individually engraved scales against National Bureau of Standards certified thermometers. And further, a rigid brass case with removable fitted cap protects the interior from corrosion, dust, and rattling.—*Scientific Instrument Co.*, 1041 2nd Ave., *Detroit* 26.

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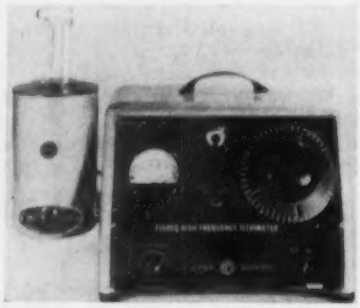

High-Frequency Titration Spots Exact End-Point

Increasing the accuracy of volumetric analysis is a new high-frequency titrimeter that operates on either a conductance or capacitance principle, whichever permits greater sensitivity. It determines the exact end-point of a titration.

This instrument takes advantage of the behavior of electric circuits in which current oscillates at very high frequencies (3.75 million cps.). When a beaker of liquid is placed in such a high-frequency field, it acts as a combined resistance and capacitance added to the circuit.

Whether the circuit oscillates at the "resonant" frequency (determined by the instrument's crystal-controlled oscillator) depends on the capacitance of the beaker and its contents.

"Loading" effect of the liquid determines the current drawn by the oscillator.

As liquid composition changes during a titration, the circuit is thrown out of balance. It is "tuned" again by adjusting a variable condenser, or the vacuum-tube voltmeter is read as an index of the change in the substance titrated.

Titration is done in a standard 180-ml. electrolytic beaker that fits inside two broad metal bands serving as the high-frequency electrodes. A magnetic stirrer and burette are provided, and the entire cell compartment is shielded by an aluminum cylinder. This assembly is mounted on a special support on the control box, to which it is connected elec-

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trically by a short length of coaxial cable.

All electrical units are standard—for use on 115v., 60 cycle a.c.—*Fisher Scientific Co., 717 Forbes St., Pittsburgh 19.*

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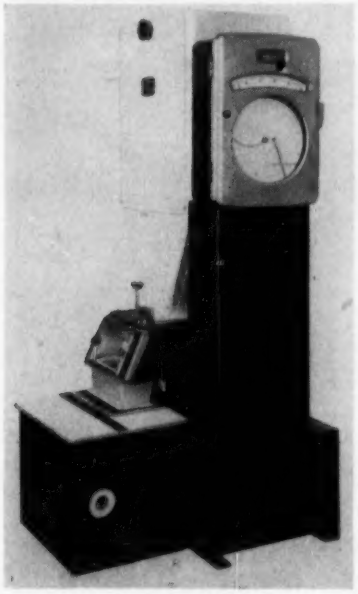

Checks, Records Rate Of Volumetric Feeder

This equipment for checking and recording rate of feed of volumetric feeders by loss-in-weight method has been redesigned and improved. Recorder is now available for small as well as large chemical feeders. Applications are: Water treatment (particularly fluoridation), sewage and waste treatment, and any chemical processing operations where records of chemical feeding are desired.

Recorder is compact and simple, with no motors, switches, relays, clutches or electrical parts (except for simple chart movement) to require maintenance. When attached to a volumetric feeder, it does not increase space requirements of standard feeder.

Want More Information?

It's free—and easy to get. Simply note here the items on which you want more details, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard—back of book. Then sign at the bottom and mail.

For your convenience, too, items in this department are listed and keyed in the Reader Service Section.

Speeds counting,

also "rubber stamping,"

cuts cost!

A common, and expensive, hidden operating cost is the practice of counting or imprinting paper items by hand. Few firms compute the salary hours spent on such work, *or realize the substantial savings possible with the Tickometer.*

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This modern office machine automatically counts coupons, cards, transfers, sales slips, labels, tabs, tickets, at from 500 to 1,000 pieces *per minute!* It feeds and stacks automatically, stops for damaged or irregular items, records part and whole runs.

Anyone can use the Tickometer to count anything that needs to be counted . . . at speeds up to 1000 a minute!

In many firms the Tickometer is used to "rubber stamp," imprint, date or cancel—as it counts. Makers of food and drug products code their package labels with it, to prevent imitations, identify origins, inspectors, factory lots —easily, quickly, cheaply.

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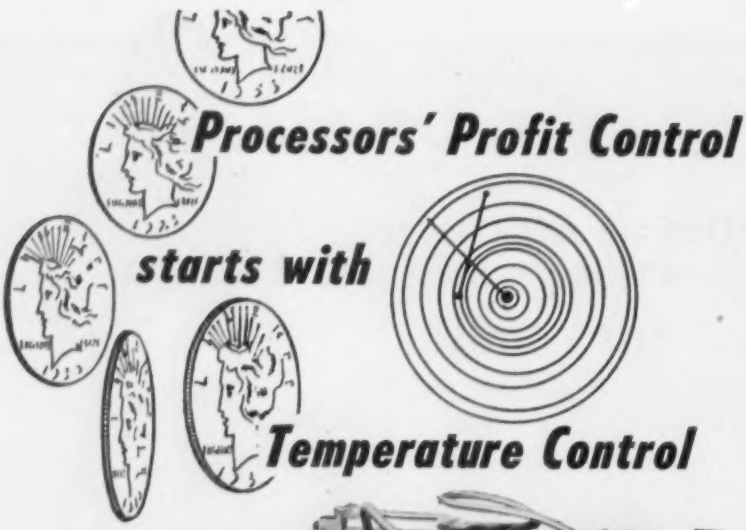

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Positive refrigeration for perishables . . . that's the big reason so many food processors specify dependable Copelametic motor-compressors for their pre-cooling, freezing and storage operations.

Your merchandise can be processed at the peak of freshness and flavor, thanks to Copelametic's round-the-clock temperature constancy. Copeland's years-ahead design and precision manufacture build this long-run performance into every unit.

Permanent, forced-feed lubrication eliminates manual oiling, hushes operating noise to a whisper. Economical Copelametic units deliver consistently high BTU at low current input. Best of all, Copelametic combines hermetic advantages (no belts or seals) with *accessibility* . . . the plus feature that permits on-the-spot servicing. No Copelametic ever requires return to the factory!

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An indicator scale continuously shows weight of chemical left in hopper and indicates when hopper refilling is necessary. Standard 24-hr. recorder charts, in 50 or 100 lb. capacity, records time of hopper reloading and gives a continuous and exact record of feeding operations.—*Omega Machine Co., 345 Harris Ave., Providence, R. I.*

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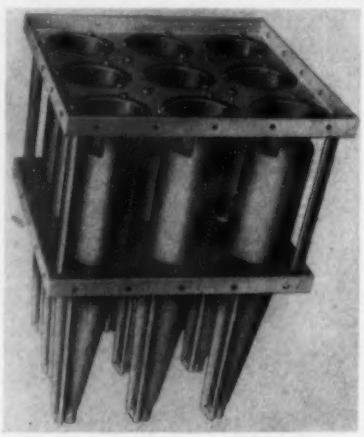


Compact Dust Collector Has High Capacity

Designed to eliminate "fly ash" in boiler operation, this new granular dust collector is credited with high efficiency over a wide range of air volumes. Called AMERclone, it operates with an outside-in twist that reverses the normal tangential flow of most centrifugal collectors.

Unit's conical inlet imparts a swirling motion to dust particles, while permitting clean air to pass through the tubes without changing direction. Each tube has an approach velocity of 1,000 fpm., and a cleaning capacity of 333 fpm.

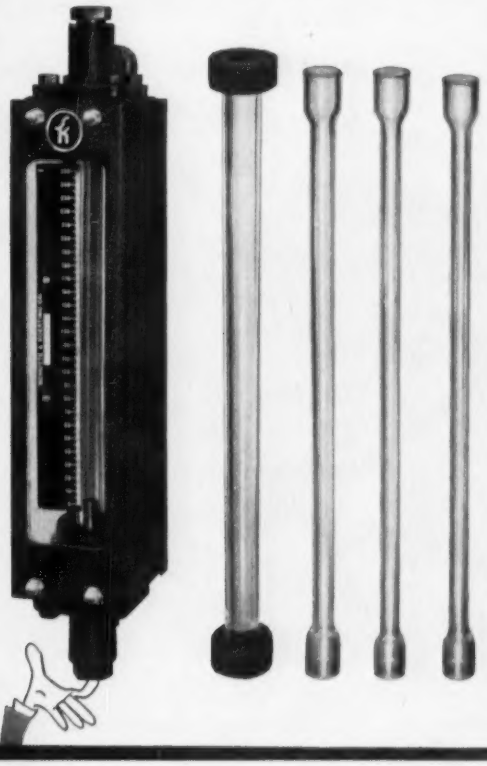
Nine tubes are combined in a standard modular cell that has a nominal rating of 3,000cfm. Cell face dimensions are 20 x 20 in., and any number of them may be combined to get required capacity. Basic unit includes a secondary exhaust circuit that disposes of the 10% of primary air and dust bled off by the tubes.

For abrasion resistance, tubes are built of thick-wall gray iron castings. Although standard unit is limited to 750 F., special materials may be used for higher temperature applications. Pressure drop through the tubes at standard conditions (70 F. and 29.92 in. Hg.) is 4½ in.—*American Air Filter Co., Louisville 8, Ky.*

Circle 150A on Reader Service Card

The versatile ROTAMETER for continuous or batch processing

wide range of capacities within one meter size lets you measure flow under changing conditions



Ever wish for a *versatile* meter? One that adapts *in minutes* to changing rates of flow? You get your wish *with the SK Safeguard Rotameter because . . .*

. . . *Four Sizes of Tubes,* each offering a different capacity, can be used in a single Rotameter.

. . . *Tubes Interchange Quickly*—can be removed and replaced to meet changing conditions.

. . . *Exclusive Belled Ends* of tubes, all having same inlet and outlet OD, permit standardization of end fittings and packings. No special tools or fittings needed.

. . . *Numerous Rotor Designs* can be used within one meter tube to provide wide range of capacities.

Where flow rates change frequently, as in proportioning dissimilar fluids, you'll find the *SK Safeguard Rotameter* outstandingly convenient and economical. Accurate, durable and safe, too, because . . .

. . . Meter Case of Strong, Rigid Steel completely encloses tube—protecting against external shock, acting as a safeguard should tube break accidentally.

. . . Heavy Gauge, Safety Glass Windows provide excellent view of tube, rotor and scale.

. . . Detachable Metal Reference Scale is clearly marked for easy reading—can be supplied in units of flow, or in millimeters for use with calibration charts.

. . . Bronze, Cast Iron or Stainless End Fittings are designed to permit connection to piping in any of four horizontal positions.

. . . Non-leaking, Seated, Clean Out Plugs at top and bottom of end fitting permit rotor removal and tube cleaning without disassembly.

. . . Packing Glands are adjustable from outside of case by means of stainless steel capscrews.

Get Your Free Copy of Bulletin 18-RG. It details operating principles, sizes and dimensions, construction features of SK's Safeguard Rotameter. Yours without obligation.

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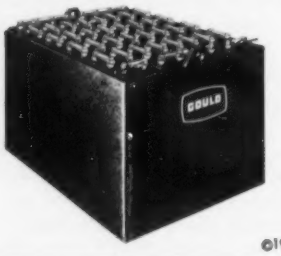

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Always Use Gould-National Automobile and Truck Batteries

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Efficient Liquid Cleaner Readily Emulsifies Oils

A highly concentrated liquid cleaner for hand washing operations is offered in 10 gal. drums, which may be stored in the plant beside equipment to be washed.

Known as TIG, this product is said to have high, long lasting sudsing action that readily absorbs butterfat. It is termed completely neutral, harmless to equipment, and non-irritant.

A convenient feature of the drum in which the cleaner is stored is a calibrated plunger-type dispenser. It is designed to assure accurate solutions without waste or guesswork. One full stroke of the plunger delivers one ounce of concentrate—enough for up to 15 gal. of water, depending on contamination. Plunger is also marked at the ½ oz. level for preparing solutions in small buckets. — *Diversey Corp,. 1820 Roscoe St., Chicago 13.*

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Surface-Coating Compound Guards Concrete Floors

Elimination of concrete "dusting" and sealing of concrete surfaces against damaging effects of food acids, grease, oil and abrasive wear is reported with use of a new protective agent.

Called Stontop, this material penetrates tiny pores in untreated concrete, and hardens the surface. It retards breakdown of sand and cement particles which, if permitted to go unchecked, lead to the formation of ruts and holes.

Application is made simply by flushing it on with a long-handled brush or mop. It dries quickly and does not discolor the floor.—*Stonhard Co., 1306 Spring Garden St., Philadelphia 23.*

Circle 153B on Reader Service Card

OTHER DEPARTMENTS Featured in This Issue

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Old Buildings

—Continued from page 76

bining our material on conveyors so that it can be handled in the proper quantity, rather than hauling it around in small, separate loads. And this was done with the least labor and investment.

Not only does it pay to combine operations, but it also pays to combine the quantities of materials that are handled.

This does not mean, however, that any one handling method (such as conveyors) will solve every problem. Here is a case that is quite the reverse:

We were sterilizing our cans in batch lots by a method that had been in use for many years. Then someone suggested that a continuous conveyor process would save money compared with the batch-handling method. And when we checked the cost angle, we found the savings in the continuous process would, in fact, be substantial.

Look Before You Leap!

But we also discovered in the course of the investigation that we could effect almost equal savings merely by doubling the size of the batch, which meant less handling and which required a very small investment. And so that is what we did.

Thus, before dividing and combining any operations, we should remember that it doesn't always pay to abandon an old method in favor of a new one. Sometimes a slight modification of the old procedure will give savings approaching those promised by new equipment and new methods entailing a substantial investment.

Keeping an open mind is always important in layout work. Though one should be guided by principles, one shouldn't be enslaved by rules. It is not always wise to adopt a new method merely in order to be "up-to-date."

Also, standardization sometimes can carry one too far. Here is an example that will illustrate:

One of our engineers noticed that our finished goods were being handled in standardized pallet-load quantities dictated by the weight that a fork truck could life. The materials on these pallets consisted of cases of strained baby food in glass. And in another part of the building this same glass came into the factory empty in the same cases. Plant operations consisted of filling the glasses with the strained food.

Now it so happened that the empty containers coming into the factory were handled in the identical quantities and with the identical pallet pattern that was used on the cases going out. This was a natural procedure and represented standardization.

However, here the engineer saw an opportunity for making savings merely by doubling the size of the load of empty containers. As a result, only half as many pallets now have to be handled (with the weight on the load still well within acceptable limits). Size of loads of full containers was not changed.

The principle involved? Well, call it combining the quantities in which you handle materials, even though you violate rules of standardization.

Remove (Clean House)

Third and last of our three principles generally applying to old plant layouts is that of "Removing."

This entails shifting from the scene of operations everything you possibly can in order to have enough space left for efficient work places.

In the jelly-making operation mentioned earlier we were using a long cooling conveyor. Jelly is filled hot, but it must be cooled and solidified when it is packed into the shipping case. Accordingly, every jelly manufacturer must have a moving belt or walking beam arrangement on which jars of hot jelly are subjected to cooling sprays.

But such conveyors take a great deal of space. And when we subdivided our jelly making into various areas we found that installation of our cooling conveyor (roughly 8 ft. wide and 35 to 40 ft. long) would take space that was needed for other purposes.

"Cross Over the Bridge"

The plant manager observed that between two buildings we had an unused bridge (another bridge being more convenient for traffic). At his suggestion the cooling conveyor was removed from the operating area entirely and installed on the bridge between the two buildings. There it was out of the way, although still accessible for maintenance.

We follow substantially this same principle in placing tanks of liquid ingredients away from production operations. Nothing is so inconvenient and cumbersome as a 1,500 gal. tank of vinegar in the middle of a food processing operation. Remove the tank to the roof, pipe the vinegar to the scene of its use—and you gain a great advantage in utilization of space.

These, then, are the three principles for fitting operations into old plant layouts—Divide, Combine, Remove.

They are possible because industrial engineers are able to use systems of piping, hauling, pumping, blowing, belting, entraining, and others, which get materials quickly and conveniently from one place to another.

The above article is taken from a talk delivered at the Packaging & Materials Handling Short Course produced by the Society of Industrial Packaging & Materials Handling Engineers under the sponsorship of the Department of Mechanical Engineering, University of Illinois, Urbana, Sept. 27-30, 1954.

End (Resume reading on page 77)

Caramel Color

—Continued from page 99

presence of oxygen to produce browning, while others disagree. Regardless of type, browning is caused by the formation of colored and unsaturated polymers of varying and unproved composition.

It appears to depend on the presence of carbonyl compounds. Reducing sugars can be transformed by dehydration*** and/or fission to enediols and osones, and to reductones and dehydroreductones which provide alpha-dicarbonyl or conjugated dicarbonyl groups and color. Or three-carbon

*** *Advances in Carbohydrate Chemistry*, Academic Press, N. Y. C., vol 6, p. 92.

Coming in Future Issues of FE

Here are some of the many practical articles currently being edited for FE readers to help them cut costs, control quality, and increase capacity:

Possible Hazard of Chemicals in Packaging Materials Evaluated
Canning Baby Foods at 1,000 Per Minute on One Line
Where Ultrasonics Stands as Processing Tool
Why's and How's of Water Treatment in Food Plants
Picture Report on New Machines at Canning Show
Proper Care and Maintenance of Stainless Steel
Current Industrial Relations Problems Aired and Evaluated
Processing and Packaging TV Dinners and Poultry Pies
Beverage Canner Puts Emphasis on Quality Control
New Candied Fruit Process Introduced in Italy
British Trawler With Quick-Freezing Plant Successful

chain compounds, such as acetol and pyruvaldehyde, may be formed. These can react and polymerize to form other intermediates under correct conditions of pH and temperature.

Mechanism of browning in sugar-amine systems apparently follows seven steps, with three proposed stages:

A. Initial colorless stage
   1. Sugar-amine condensation
   2. Amadori Rearrangement from normally substituted glucosylamine to the keto-enol compound, normally substituted 1-amino-1-deoxy-2-ketose.

B. Intermediate colorless or yellow stage
   3. Sugar dehydration
   4. Sugar fragmentation
   5. Amino acid degradation

C. Final highly colored stage due to melanoidin formation
   6. Aldol condensation
   7. Aldehyde-amine polymerization; formation of heterocyclic nitrogen compounds.

Reactions (3) and (4) are believed to be of prime importance with (5) secondary.

Formation of caramel color, with the many possible reactions, plus a large number of controlling variables, such as temperature, pH, and concentration of reactants, makes the chemistry of browning an intricate subject. Thus, the exact chemical composition of caramel color is not known.

Burning of sugars to produce caramel color developed as an art, not a science. But research is now making strides to explain the art that has made this valuable product possible.

Above article is based on talk given by the author at a recent Sectional Meeting of the Institute of Food Technologists in Rochester, N. Y.

End *(Resume reading on page 100)*

Streamlined Plant

—Continued from page 87

Swift, uniform heating of the water in each double cooking vat is achieved by an 18-in. exhaust fan, hooked up to four vertical 5-in.-dia. stainless steel ducts. In turn, each duct is attached to 17 ft. of 5-in. vat-submerged coil, which is connected to a gas burner.

By merely flicking on the exhaust fan, the gas flame is pulled clear through the 17 ft. of coil for quick heating of the water. This heating is so efficient that temperature of vertical ducts to exhaust fan reaches 450 F.

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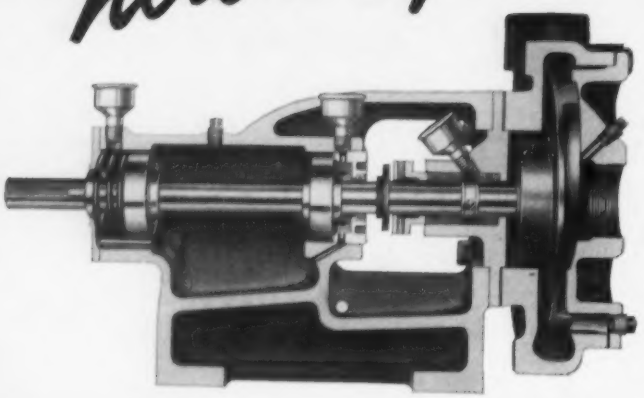
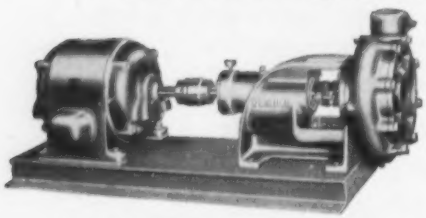
For more information, use coupon on last page.

here they are



DEMING FIG. 4011 SERIES CENTRIFUGAL PUMPS



Highest performance ratings per dollar of investment are assured by the new design and construction features of this series of Deming End Suction Centrifugal Pumps.

Check the performance ratings of Deming Fig. 4011 Series Centrifugal Pumps in Bulletin No. 4011. (Send for it). Other advantages are heavy, ruggedly designed power end giving rigid support to liquid end of pump; semi-open, non-clogging, adjustable type impeller; optional deep packed stuffing box or mechanical seal; separate liquid end construction makes it economical to adapt pump for handling corrosive liquids.

You can solve a wider range of pumping problems with this versatile line of pumps. *Investigate!*

Send for Illustrated Bulletin No. 4011

THE DEMING COMPANY
556 Broadway • Salem, Ohio

Please send me a free copy of your illustrated Bulletin No. 4011 which gives full details about your No. 4011 Series End Suction Centrifugal Pumps.

Name _____

Address _____

Company _____

City _____ Zone ____ State _____

75th ANNIVERSARY DEMING PUMPS 1880 - 1955

railed out of the smokehouses and into a single-rack-capacity Jordan cooker. From here, product is railed to an adjacent company-built shower. Unit comprises a ceiling-suspended metal pan, 4 ft. sq. and 6 in. deep. Water is piped to the showering pan, then flows through ¼-in. perforations, spaced 1½ in. apart, to spray-cool hot sausage products.

Finished items either are trucked or monorailed to a 16x34-ft. packaging-shipping cooler (37-40 F.). Empty racks move out of the other door of the cooler directly to the stuffing department, without any impediment to the flow. Depending upon the kind and variety, the product either is weigh-packed into cartons or placed on flat cardboard backing to be cello-overwrapped by machine (Hayssen). Cartons then are loaded onto double-shelf truck-carriers going to the shipping dock.

Design of the new building included specific attention to the menace of heaving or buckling of the basement-freezer and cooler floors due to poor water drainage. Such possibility has been eliminated by laying 2 ft. of small stones below the combination 4-in. concrete, 8-in. cork, and 4-in. concrete floors.

Set in one direction along the bottom of the stone layer are 6-in. drain tiles spaced 5 ft. apart. And six 4-in. metal pipes run from the front outside end of the building, through the stone layer, and along the outside of the cooler.

End (Resume reading on page 88)

Advanced Machines Do It

—*Continued from page 70*

to a banding maching (Kartridg-Pak). This unit automatically bands the franks in cartridge-link units of ten with a perforated strip. Paper band carries the brand and name of the packer. Banded frankfurters are then packed into cartons, which are check-weighed.

On the retail packaging line, girls paper-collar the franks and place them on a conveyor feeding an automatic electronic check-weigh machine. (Selectrol).

This unit rejects over- and under-weight packages onto two conveyors, while correct-weight packages continue on a middle belt to a cellophane wrapping machine (Battle Creek). Over- and under-weight packages are check-weighed to proper weight by two girls, then fed to the wrapping machine. Packages are packed twelve to a carton.

End (Resume reading on page 71)

TO GET ALL THE PERFORMANCE DESIGNED INTO YOUR PRODUCT

Choose **Century MOTORS**

From the Wide Range of Types of

In Sizes From 1/8 to 400 Horsepower

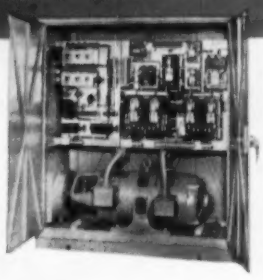
SINGLE PHASE:

Split Phase Induction—⅛, ¼, ⅓ H.P.

Capacitor—⅛ to 20 H.P.
Repulsion start, brush lifting, induction—½ to 7½ H.P.

Write for Bulletin Nos.:

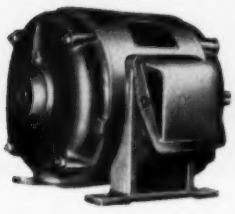
Split Phase 1-5P1
Capacitor 1-1P3
Repulsion Start 2-1P1



SELECTIVE SPEED DRIVE:

A complete line of adjustable speed drives for coordinating all kinds of production processes.

Write for Bulletin No. 11-1P1



POLYPHASE:

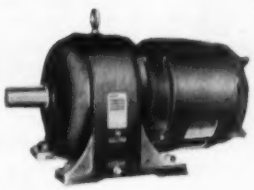
Squirrel Cage Induction—
⅛ to 400 H.P.

Wound Rotor Motors—1 to 400 H.P.

Synchronous Motors—20 to 150 H.P.

Write for Bulletin Nos.:

Squirrel Cage, Drip Proof—6-1P1
Squirrel Cage, Splash Proof—6-1P3
Squirrel Cage, Enclosed Fan Cooled—6-1P41
Squirrel Cage, Explosion Proof—6-1P45
Wound Rotor—6-3P1



GEAR MOTORS:

⅛ to 15 H.P., single, double and triple gear reduction.

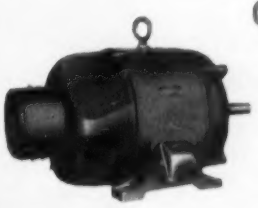
Write for Bulletin Nos.:

⅛ to ¾ H.P. . 4-5P21-61
1 to 15 H.P. . . 4-1P31

DIRECT CURRENT:

All capacities—⅛ to 300 H.P.

Write for Bulletin No. 10-1P1



GENERATORS:

AC, .63 to 250 KVA
DC, .75 to 200 KW

Write for Bulletin Nos.:

AC, .63 to 250 KVA—18-1P21
DC, .75 to 200 KW—18-1P1

Motors listed above are available in Open Rated Drip Proof, Splash Proof, Totally Enclosed Fan Cooled and Explosion Proof frames—and with a dozen different methods of mounting. They are unusually quiet starting and running and unusually free from vibration.

B78

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City ..... Zone ..... State .....

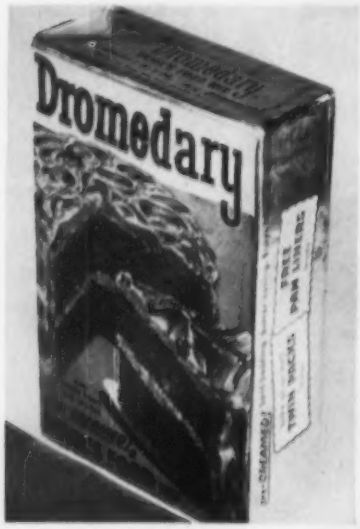
For more information, use coupon on last page.

NEW PACKAGES & PRODUCTS

Four Frozen Dinners

Planned for Spring marketing are four new Birds Eye quick-frozen, pre-cooked dinners. The dinners are: chicken a la king with corn, rice, and green beans; sliced turkey with dressing, parsley, buttered potatoes and peas; pot roast of beef with gravy, parsley, buttered potatoes, and peas; and chopped steak with mushrooms, french fried potatoes, and peas.

The dinners will be packed in the standard compartmented aluminum trays. Instructions will be included for preparing the meat portion rare, medium, or well-done without affecting the vegetables.



Pre-Creamed Cake Mixes

Employing a special shortening and a new pre-creaming process that cuts beating requirements, Hills Brothers Co. has released a new line of cake mixes under their Dromedary label. Processed in white cake, devil's food and yellow cake, the new mixes are packed in a twin-pack unit. The two packages of the mix in each carton enable the consumer to bake either a generous one layer cake or a big two layer cake.

Free pan liners, marked in vegetable ink, for use in either round or rectangular cake pans, are included in every carton. The carton also features a gold foil wrap to insure freshness. The label presents an extra-large reproduction of the prepared cake and prominently displays the "pre-creamed" feature.

Molds Dress Up Food for Table

Plastic molds and fluted jars are being used by two processors to spark dinner table appeal of ready-to-eat products.

The Borden Co. has introduced Elsie-molds, an ice cream and sherbet product filled into clear spiral-fluted vinyl plastic film molds. Disposable, the molds are of inexpensive Bakelite Krene (158A). Each holds enough dessert for one person, and they are packed four to a carton.

The molds are supported within circular cardboard collars which have a lid at the open end. The servings are easily sealed and may be served by removing the lid at the base of the mold and pushing down on the transparent film.

Successfully test marketed in Elgin, Ill., the Elsie-molds will now be marketed nationally. A special modified attachment for Anderson fillers was developed by Anderson Bros. Manufacturing Co., Rockford, Ill. (158B) to accomodate the molds.

Salads Inc.'s fluted glass jars provide a mold for the contents—various fruit and vegetable salads. The jars are displayed with the cap down, giving the consumer a full view of the contents. Reusable as a refrigerator jar, the 14-oz. containers are manufactured by Fairmount Glass Works, Indianapolis (158C). The metal screw caps are by Armstrong Cork Co. (158D).

Circle key numbers on Reader Service Card

Kit, Packets for Salad Dressing Mix

A salad dressing mix in individual packets and in kit form is being marketed nationally by General Foods. Processed in Chicago by Perkins Products Co., a subsidiary, the product is a powder made in five flavors: Old Fashioned French, California French, Bleu Cheese, Exotic Herbs, and Old Fashioned Garlic. Carrying the Good Seasons label, the mixes are packed in brightly colored envelopes, the color of a circular tab on the front aiding in flavor identification.

The kits, comprised of a mixing bottle, two mix envelopes, and a recipe booklet, will be a feature of the introductory campaign. The attractive bottle is marked to indicate the cor-

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AUNT JEMIMA'S NEW "COUNTER-KITCHEN" BOOSTS PANCAKE SALES IN RESTAURANTS THROUGH QUICK SERVICE. KEY TO NEW MERCHANDISING IDEA IS SINGLE-PORTION PACKAGE USING RIEGEL'S POUCHPAK, A SPECIAL POLYETHYLENE COATED AND PRINTED POUCH PAPER. RUN AT HIGH SPEED ON STOKESWRAP MACHINE.

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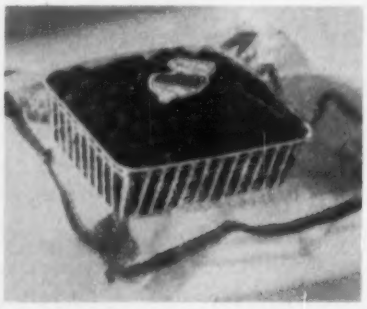
STAR-KIMBLE
MOTOR DIVISION
Miehle Printing Press and Mfg. Co.
207 Bloomfield Ave., Bloomfield, N. J.

rect amounts of oil, water, and vinegar. Each kit has two of the mixes, the carton carrying the names of the flavors included and their identifying colors. The carton is windowed.

New Mozzarella Process

Increased shelf life and retention of natural color for Mozzarella cheese is the result of P. Gambardella & Sons Cheese Corp.'s new flash brine curing method. An exclusive process, the new method prevents the off-color that appears with standard brining. Shelf life of the product has also been increased from 30 to 90 days.

An attractive package comprised of a 4-oz. jar of grated Romano cheese and a plastic dispenser is spurring sales of the same company. The dispencer offers a sanitary method of serving the cheese and protects flavor by keeping air from the product.



Feminine-Appeal Basket

Termed the "glamour package for 1955" by the maker, Cello-Masters, Inc., New York City, an attractive pack for produce, candy, and baked goods stresses feminine appeal.

A pastel oblong basket of resilient, lightweight polystyrene topped with a skirted cellophane cap, the package has proved successful in tests. The re-use value of the basket, complete product visibility, and the frilly appearance, are reported to be especially attractive to the housewife.

Circle 160A on Reader Service Card

New Sizes for "Coke"

Prompted by consumer demand for more convenient sizes, Coca-Cola Co. has provided 10- and 26-oz. companion bottles for its familiar 6-oz. size.

Retaining the famed shape of the smallest bottle, the new intermediate and large size are being introduced in San Francisco, Oakland, Springfield, Mass. and Hayward and Pittsburg, Calif. Distribution is being limited to these areas, pending the processors completion of its consumer acceptance study.

The new bottles are directed primarily at the family market.

Low Calorie Loaf

Reported to contain approximately 26% less calories than average white bread, Daffodil Farm Enriched Bread has been introduced by Continental Baking Co., New York.

Four slices of the new bread are said to be equal in protein content to five slices of whole wheat bread. Basis of this statement is the distribution of complete protein as limited by lysine of equal weights of the Daffodil Farm bread and an average of eleven whole wheat breads tested.

Wrapped in a colorful red, yellow and green wrapper, the loaf is slightly smaller than standard size.

New Candy Ingredient

Whole, sweetened, preserved cranberries retain their natural color and flavor in a special process developed by Kenneth G. Weckel, Professor of

Dairy and Food Industries at the University of Wisconsin.

Holding excellent promise as a new candy ingredient, the product has already proved successful in experiments using a cordialed candy.

Called Cransweet, the product is the result of a process which pierces each berry to provide a path for the sugar syrup used to cut the cranberry's natural tartness. Old processes usually caused the fruit to rupture.

Variables like acidity can be adjusted, and under proper conditions of temperature and sugar concentration, the berries are impregnated with the processing syrup in a vacuum chamber.

The new process can utilize either fresh or frozen berries.

Circle 160B on Reader Service Card

Lemon Rind Product

Called Raspatura Limone, a new lemon product has been developed by Dodge & Olcott's flavor department. Made of finely grated and dried lemon rind, the product serves to impart the flavor, texture, and color of fresh lemon rind. It is particularly applicable to pie fillers, and bakery products.

The flavoring comes in two forms, basic and with 5% lemon oil. The latter contains enough oil to impart required flavor when used at approximately the same rate as a regular baker's emulsion on a weight for weight basis.

Circle 161A on Reader Service Card

Wine-Flavored Sauce

Skip's Barbecue Sauce, available in six different wine flavors, is said to be the first sauce of its kind on the market. Packed in a Chianti-style bottle, it comes in Port, Sherry, Tokay, Muscatel, Burgundy and Orange-Creme de Mieux flavors. A booklet of Skip's Bar B-Q suggestions is attached to each bottle.

Manufactured by Skip's Food Products, Los Angeles, the product is now distributed in Los Angeles County.

Fast as a Snap!
These products — plus an endless variety of others are package-wrapped
...ready for market!
AUTOMATIC — continuous rotary motion provides amazing, new, high speed wrapping production — eliminates counter-acting motion that causes material breakage and machine down-time.
"FLOAT" WRAPPING — packages products of regular or irregular shape *without* breakage or crushing whether product is hard, soft, firm or brittle. Size change-overs accomplished with minimum down-time.
POSITIVE SEALING — by heat, glue or crimping keeps moisture where you want it—in or out. Sanitarily protects against dirt, dust and handling. Ends may be flared, folded under or diamond folded — longitudinal seams heat or glue sealed.
SAVES LABOR . . . MATERIALS — push button, *automatic* feeds permit one person operation and tending of several machines at the same time. And, because no stiffeners are required, *unless desired*, savings of 25 to 50% in materials are effected.
USES ALL MODERN WRAPS — Cellophane, glassine, foils, films, polyethylenes and others. Electric registration accurately positions pre-printed or attached labels.
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BAKERY PRODUCTS
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4½" DIAL THERMOMETERS

Made in 3 types to suit any requirements. Rigid stem, wall or flush mounted, 11 inches of scale reading. Interchangeable with standard industrial separable sockets. Stem can be placed at any angle and case can be rotated to any readable position.

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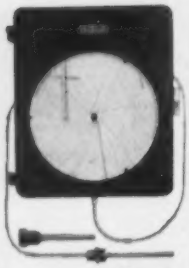
Temperature Indicating Instruments

RECORDING THERMOMETERS



Twelve inch die-cast aluminum case with black or white wrinkle or satin finish. Single or multiple pen construction. Electric or spring wound clock, 24 hour or 7 Day Revolution. Flexible Armor and bulb of stainless steel. Ranges —40 +950°F or Equivalent in °C.

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Red-Reading Mercury —Extruded brass case — chrome finish. Ranges —40 + 950°F or Equivalent in °C.

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THERMOMETERS, INC.
Cincinnati 12, Ohio • MElrose 1500

Closure and bottle neck are covered with a hooded, red Cel-O-Seal band. Label is metallic gold with bronze and red lettering. Container and metal screw-type closure made by Owens-Illinois Glass Co., San Francisco.

Sharp and Mellow

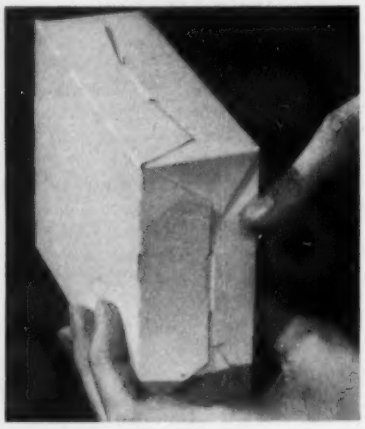
Fine cheddar cheese—both sharp and mellow—is being processed by Kraft Foods Co. under the Cracker Barrel label. Packaged in foil, the sharp and mellow flavors are distinguished by the package color, gold for sharp, and silver for mellow.

Rindless, the cheese is marketed in wedges, squares, and oblongs. All styles are available in 8-oz. sizes, while some have a special 13¼-oz. package.

Canned Dessert

H. C. Brill Company Inc., Newark, N. J., has introduced old fashioned rice pudding in a 15-oz. can. Made with fresh milk, rice, sugar, eggs, salt, pure vanilla, and spice, the product is ready to serve, though it may be chilled or heated.

Designed by Rossotti Lithographers, the label features brand identification on an old fashioned sampler.



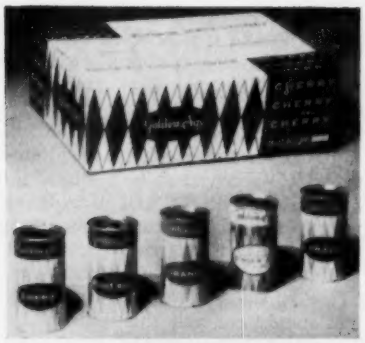
New Carton Solves Leakage, Lock Failure

Planned for use with hot-filled or semi-liquid items, a new cellophane-lined frozen food carton has been introduced by Kliklok Corp., New York City. It features leakproof controlled-gusset liner folds and double-locked corners.

Directed at solving the leaking and failure to lock often experienced when packaging such foods as spinach, chicken a la king, cooked squash, stews, and disjointed chicken, the carton boasts dual corner locks, combining a top edge "stripper" lock with an added safety engaging slit. Positive action and efficiency of these locks is maintained despite steam and heat from hot-packed foods, according to manufacturer.

Controlled gusset folds in the cellophane inner liner prevent leakage. They are made automatically by the set-up machine when the carton is erected, resulting in complete uniformity.

Circle 162A on Reader Service Card



Gets 1954 Packaging Award

Golden Age Beverage Co., Akron, O. has been presented with the 1954 Package Designers Council award as the best package in the food category. The designs for the canned pop and its cartons employ an elongated diamond pattern. Designer was Smith & Scherr, Akron

Metal Bottle for Foods

American Can Co. has unveiled a line of "metal bottles" specifically designed for such liquid food products as molasses, syrups, salad dressings, catsup, or cooking oils. The 22-oz. can with the screw-on plastic cap and aluminum nozzle is only slightly more expensive than bottles. It has a "no-drip" feature and may be shipped without breakage problems.

Circle 163A on Reader Service Card

—*End*—

Radiation Costs Gaged

—*Continued from page 103*

of penetration needed to pasteurize large roasts, hams, turkeys, etc., may be desirable.

The traveling-wave accelerator operates on the relatively low voltage of 150 kv (thousands of X-ray machines

removes risk of contamination in food processing and canning

Juices, acids, alkalies, fats, oils . . . *all liquids* remain on the surface of solid woven Globe Kanry-Tex Belting. Neoprene latex impregnation of all fibres and voids *locks them out!*

Odors and flavors are not picked up nor imparted. Neoprene latex impregnation stands guard against them!

There you have two BIG reasons why fruits and vegetables conveyed with non-absorbent Kanry-Tex are not contaminated en route . . . why sorting and inspection are accomplished without adding "foreign" taste.

But there are other reasons — all just as important to food processing, canning and dehydrating plants — why Neoprene latex-impregnated Kanry-Tex is the most satisfactory of all belting. It may be washed and sterilized with hot water or live steam. Age won't deteriorate it — fibres are rot-free. There are no plies to separate. It's a solid woven carcass. It's tough, lasts longer, thereby reduces belting costs and downtime for change-over. Extremely flexible, it can be run over small pulleys. It permits slitting and trimming to narrower widths with clean-cut, unfrayed edges.

Write Dept. E for free samples, literature and the name of your local distributor.

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PRESSURE PLATE FREEZERS

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35% GREATER CAPACITY

Most Economical and Simple to Operate

Flat, Uniform Packages—Always

Fast Freezing Retains Full Flavor

Designed For Ammonia Brine or Freon Refrigerant

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"It's the Contacts that Count"

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operated by physicians involve up to 250 kv). And it is believed that electron accelerators can produce radiation more cheaply than radioactive sources.

W. F. & John Barnes Co., Rockford, Ill., is the exclusive distributor of ARCO accelerators to the food industry in the U. S. And in addition to the radiation research laboratory now being constructed by ARCO at Walnut Creek, Calif., a second accelerator will be installed in Rockford some time early this summer.

References and Bibliography

1. S. A. Goldblith and B. E. Proctor, "Relative Merits of Cathode Rays and Gamma Radiation," *Nucleonics*, Feb. 1954.

2. B. F. Proctor and S. A. Goldblith, "Electromagnetic Radiation Fundamentals and Their Applications in Food Technology," *Advances in Food Research*, Vol. IV, 1951.

3. B. F. Schweigert "Grappling With Problems of Cold Sterilization, FOOD ENGINEERING, Sept. 1954.

4. L. E. Crean, P. J. Isaacs, G. J. Weiss, and F. Fahnoe, "Application of Isotopic Sources to Food and Drug Sterilization," *Nucleonics*, Dec. 1953.

End (Resume reading on page 105)

Superior Powdered Juices

—Continued from page 73

A low loss level can also be maintained, in the face of unfavorable storage conditions, by separate incorporation of a packet of desiccant. This packet is inserted in the product container before it is closed.

Desiccant preferred is calcined lime, as described in U. S. Quartermaster Corps Tentative Specifications. Lime is enclosed in a siftproof, moisture permeable envelope bearing printed instructions to the consumer to discard when the container is opened.

Dehydrated juice crystals, which are easily prepared, are high in relative nutritive values and are stable during storage.

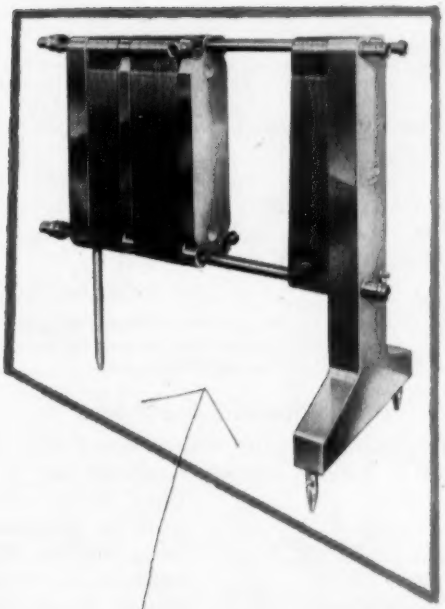
Though vacuum processing requires considerable capital investment, processing costs of the dehydrated products are modest. On the other hand, storage and distribution costs of the drys are materially lower than those of competing products.

Shipping-weight saving of the dry crystals, as compared to single strength juice, is 86%. Storage space saving is 77%. And handling cost savings are 82%.

Since the dry products required no refrigeration between plant and consumer, additional processing cost of dry products, as compared to frozen concentrates, is more than made up by the complete elimination of start-to-finish refrigeration costs.

End (Resume reading on page 74)

WHAT DO YOU LOOK FOR IN A PLATE HEAT EXCHANGER?



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INSIDE SCIENCE

White Flour in the U.S.A.—

Enriched* with Vitamins and Minerals for Better Nutrition

by Science Writer

This article is one of a series devoted to the enrichment of family white flour, white bread and rolls, corn meal and grits, macaroni products and white rice.

The enrichment of family white flour with thiamine, riboflavin, niacin and iron by American millers is a major success. It has made great contributions to better health in the United States by improving a staple food.

Since the start of the program in 1941 by millers, voluntarily, the evidence is conclusive that enrichment not only has reduced the number of cases of certain dietary diseases but also is promoting the mental and physical vigor and well-being of the U. S. population generally. Because of its demonstrated value, the principle and practice of enrichment have been applied to other foods made from grains: corn meal and grits, white rice, macaroni, spaghetti, noodles, pastina, farina—and, of course, to white bread and rolls.

Doctors and diet experts have long supported white flour enrichment. The Council on Foods and Nutrition of the American Medical Association and the Food and Nutrition Board of the National Research Council are on record as endorsing the practice.

The legislatures of a majority of the States plus Hawaii and Puerto Rico have enacted laws which make mandatory the enrichment of all family white flour, as well as white bread, sold commercially in those areas.

American homemakers, too, favor foods they know to be enriched—a fact demonstrated by surveys. They look for these words on package labels: "Enriched with vitamins and minerals for better nutrition."

What Is Enrichment?

It's an axiom in the milling industry that consumers want beautifully fine, white flour. When wheat is milled and processed to get the white flour which the public demands, vitamin and mineral values are unavoidably lost.

Enrichment restores to white flour the following important vitamin and mineral factors: thiamine, riboflavin, niacin and iron. Calcium also may be added as an optional ingredient. The process is simple and inexpensive. A mixture of the vitamins and iron is fed into the flour stream during processing. This insures that the enriching ingredients are spread evenly throughout the flour.

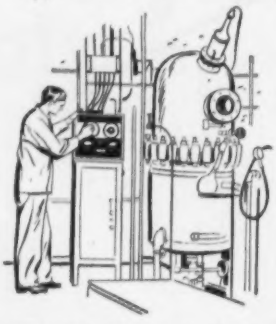
The U. S. Food and Drug Administration has established standards which white flour must meet to be properly labeled enriched. The requirements, in milligrams per pound, are:

	Min.	*Max.*
Thiamine (vitamin B_1)	2.0	2.5
Riboflavin (vitamin B_2)	1.2	1.5
Niacin (another "B" vitamin)	16.0	20.0
Iron	13.0	16.5

(In Canada, too, the same standards have been set for enriched white flour through the amendment of the Food and Drugs Act.)

Vitamins Are Made

The science of chemistry is so advanced these days that many of Nature's complex substances can be "duplicated" in the laboratory. This has happened with many vitamins. First, the chemical composition is learned. Second, the pure substance is isolated. Third, a "duplicate" is made by synthesis. And fourth, the laboratory techniques are extended to large scale operation.



The manufactured "duplicate" is identical chemically and in biological activity with Nature's own product. A vitamin is still a vitamin regardless of its source. So efficient is large scale manufacturing that vitamins are sold at a lower cost than if they were extracted from natural sources.

The Hoffmann-La Roche people make top quality vitamins actually by the tons. To do this they use amazingly complex processes with scientific production controls and the latest equipment which fill buildings each a city block square and many stories high.

Reprints of this article, and all others in this series are available without charge. Please send your request to the Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West; Montreal, Quebec.

The watermills are gone. Today's needs require today's methods. How sensible it is that millers across the nation restore health-giving vitamins and minerals through enrichment.

*Webster's Merriam Collegiate Dictionary includes this definition of "enrich": "to improve (a food) in nutritive value by addition in processing of vitamins and minerals".

ADVANCES IN TECHNOLOGY

Quick-Cooking Rice

Several methods for preparing quick-cooking rice were subjects for recently granted patents.

In the processes, unbroken rice grains are heated (using hot air or infrared radiation) to produce fissures, then subjected to moisture and heat to gelatinize the starch and cause grains to soften and swell beyond their original size. This is followed by quick drying to remove moisture from grain surfaces and set them in their enlarged condition to produce a porous structure therein—U. S. Patent 2,696,156, '57, '58.

Effect of Antibiotics On Cows Milk

When aureomycin is fed to cows it does not appear to be carried through in the milk.

This was determined by examination of milk from 20 cows participating in a study on feeding aureomycin. Rate of feeding was equivalent to an average of 390 mg. per cow daily.

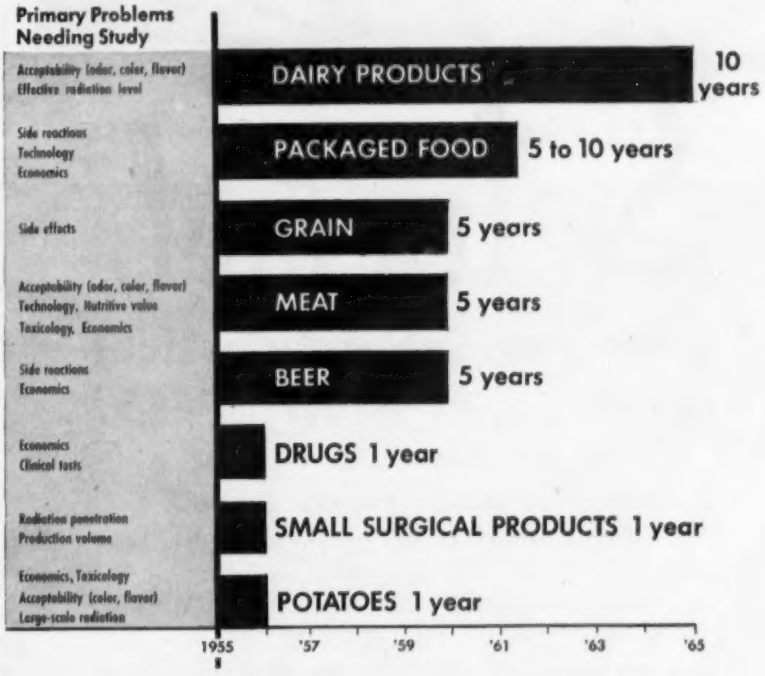
Bacterial determinations on the raw milk showed no reductions in total numbers of the species that developed. Acid development in the starter-inoculated milk was normal. Cheese made from it was equal to that made from milk from cows that had never received the antibiotic. There was no marked difference in rate of acid development, or in amount of acid produced in the cheese.

The milk was also tested for aureomycin content but no detectable amount was found—*Journal of Dairy Science*, 47-52, Jan. 1955.

New Juice Product

Preparation of a fruit or vegetable juice product containing substantial quantities of suspended, pureed pulp is the subject of a recently patented process.

Method comprises comminuting the stock to a pulpy condition followed by screening and discarding the fibrous matter caught on screen. Then stock is again screened and a primary juice collected. Material caught on 2nd screen is shredded to form small fibrous filaments and jelly-like pectinous product—combination is a puree-like material. This is mixed with the primary juice to form final juise product —U. S. Patent 2,696,440.



Sterilization of Foods by Radiation Seen Possible Within Ten Years

On an experimental basis, radiation sterilization of foods has been accomplished using cathode or beta rays, gamma rays, and X-rays. All three types destroy bacteria at dosage levels of 1,500,000-3,000,000 rep.

With accelerator-produced cathode rays, sterilization dosages are achieved in a matter of seconds. However, effective depth of penetration—0.5 cm. for each Mev of particle energy—limits food thickness. Irradiation from top and bottom would enable doubling the thickness.

If this method is used, thin layers of food must be treated followed by aseptic packaging, or sufficiently thin packages prepared to permit in-package sterilization.

Gamma rays emitted from gross fission products will penetrate 6-9 in. of water before losing half their energy. Using proper radiation geometries, these rays could be used to sterilize No. 10 cans of food.

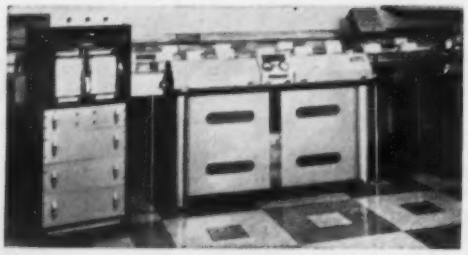
Unfortunately some undesirable chemical and physical changes take place. They are in direct proportion to radiation doses and vary from product to product. Bread, liver and green beans do not seem to develop off-flavors and odors; milk and meat do.

This problem must be overcome before wide application of the process is possible. Research workers feel confident that it can be done by application of one or a combination of the following: Irradiation in the frozen state; in vacuum; under inert gas; in presence of various chemicals, or in absence of oxygen.

Increasing shelf life of the products offers the most promising introductory application of ionizing radiations in the food industry.

Treatment at low dosage levels (20,000 rep) to give surface pasteurization has increased refrigerated storage life of precut, prepackaged raw meats from 5 to 10 times. Fruits have shown extended life by flexible packaging and surface treatment. Potatoes irradiated with 20,000 rep, had excellent appearance and taste after 18 months storage, with greatly reduced weight losses, and no sprouting.

Prevention of insect infestation of grain or other dry foods can be attained with low radiation doses compared with those needed for sterilization. One of the above may be the first application of ionizing radiation in the food industry—*Nucleonics*, 36-45, Jan. 1955.



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Catalytic Coffee Roasting

Use of activated carbon in some form is the crux of a patented process for improved roasting of coffee. In addition to better flavor, the method is said to restore weight lost by evaporation and volatilization, and cut roasting time in half.

In one example, 100 parts of green coffee berries are mixed with 50 parts of ordinary coke, free from fines and sized from ¼ to 1 in. Mixture is roasted in usual way, and progress of the roast is observed by senses of sight and smell. A roast that otherwise would take 15-21 min. may be completed in 9.

Hot berries are cooled rapidly, preferably with a spray of cold water, about six parts by weight. Berries may be ground at room temperature, and enough water, or cracked ice, added to restore original weight.

Superior results of the process are believed to be due primarily to catalytic alteration of chemical reactions of substances affecting flavor and aroma, and to the better heat transfer resulting from lower specific heat and higher thermal conductivity of coke. Other forms of carbon can be used as catalysts, and additions to the coke of copper, platinum sponge, and granular nickel have been tried with good effect. —U. S. Patent 2,689,795, Sept. 21, 1954.

Prefab Baking Ovens

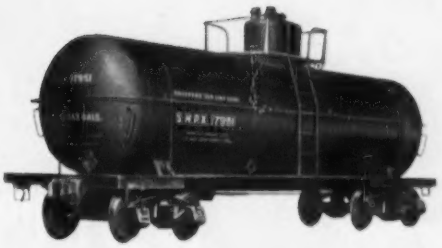
Lower first cost and economy in erection of reel-type baking ovens is claimed for a patented construction of prefabricated wall units—sides, top, and bottom.

Sub-assemblies are produced at the factory and shipped to the site for final and expeditious erection. A unit comprises two sheet metal plates with flanged edges, forming pan-like elements. Plates are positioned with their flanges toward each other, and the space between is filled with bats of insulating material. Means are provided for tieing the plates together and for connecting a series of them in a wall of the oven—U. S. Patent 2,691,432 Oct. 12, 1954.

Antibiotics In Pig Fattening

In high-quality diets containing fish meal antibiotics have little effect on food intake by young pigs, but there is an improvement in utilization efficiency and hence a better live-weight increase. With low-grade diets (all vegetable) antibiotics have an appetite effect even when feeding is unrestricted.

Inside story of Duradome



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In trials of 10 pigs to a pen with *ad lib* feeding, effect of penicillin was to increase daily live-weight gain in 105 lb.-pigs from 1.68 to 1.75 on a fish-meal diet. On an all-vegetable diet 100-lb.-pigs gained 1.48 lb. daily without penicillin, 1.55-1.60 lb. with it.

Since a change in diet alone will also produce retarded weight gains, pigs started on antibiotic diets should be maintained on them. Response to procaine penicillin is small after pigs reach 100 lb. live-weight, and may be small after 70-lb. is reached.

Carcass conformation of pigs fed antibiotic diets showed no differences from that of pigs on normal diets, and there is no evidence that the carcass of pigs so fed are inferior in commercial grade—*Journal of the Science of Food & Agriculture*, 541-49, Nov. 1954.

Chemical Changes Occur In Beef-Curing Brines

Brines used for curing of beef (salt 1790 parts, potassium nitrate 53, brown sugar 21, spices 21, tap water 6804 parts) undergo a series of changes during use that can be summarized as follows:

1. When fresh there is an increase in soluble meat constituents and bacteria, with attainment of a stable pH of 5.8. Enough nitrite is formed for color development but penetration of the meat is slow.

2. After about 3 weeks or 6 curings of meat, the brine is fully matured and good cures are obtained. Nitrite production is maintained and color penetration is greater. Bacterial growth increases but numbers are not great enough to destroy nitrates and decrease acidity.

3. Bacterial population (halophilic, Gram-negative rods, *Achrombacter* species) increase to 40-million or so per ml., and conversion of nitrites to nitrogen is faster than nitrite formation. With loss of nitrates, decrease in acidity and precipitation of organic matter occur. Good cures are obtained, but accumulation of amines imparts off odor to the brine making it unusable.

Changes described took place in 13 weeks. In commercial practice the rate and extent of the changes may be somewhat less—*Journal of the Science of Food & Agriculture*, Vol. 5, No. 12, 573-83, Dec. 1954.

Smoothness of Chocolate

Estimation of fineness of particles in chocolate is a problem only partly solved. Sieving is impracticable, and

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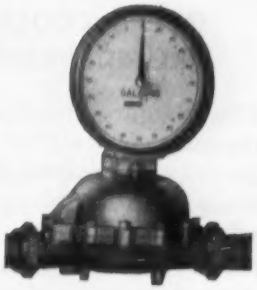

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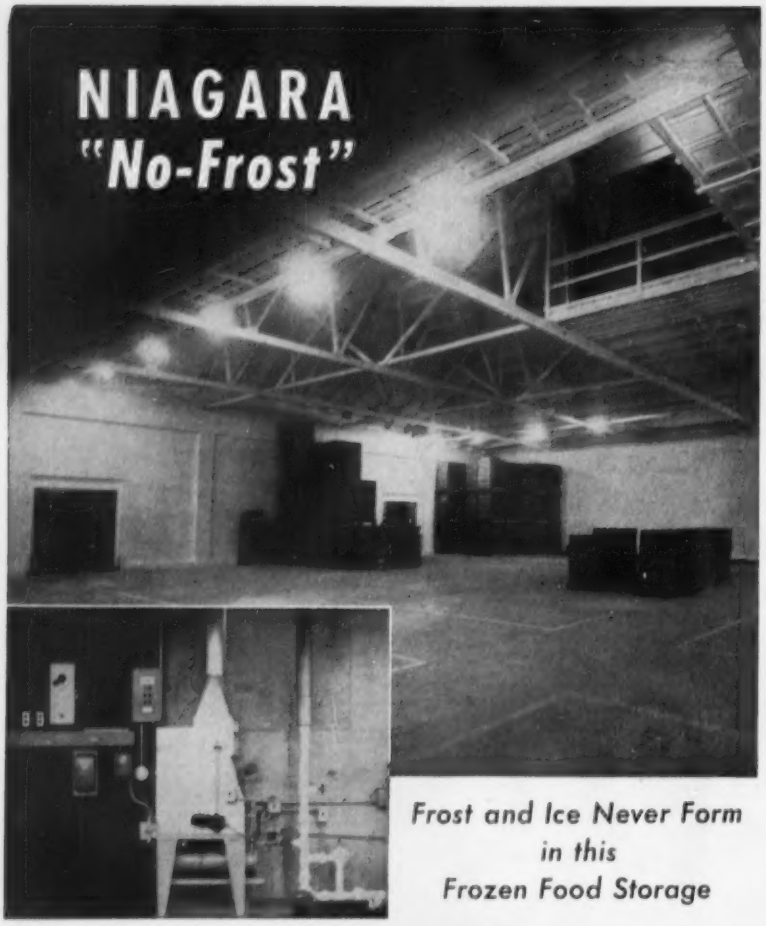

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elutriation is slow and requires large and cumbersome apparatus.

Microscopic measurements and counts are subject to wide variations, though the Micro Value method of Mason has been considerably used. The Standard Drop method of Bamford yielded figures for the Micro Value that were within 20% of true value in 19 out of 20 trials and within 10% in 2 out of 3 trials.

The Andraessen sedimentation method disperses sample in petroleum ether containing a wetting agent, and permits suspension to settle in a tall cylinder with a side sampling cock at fixed height from bottom. By withdrawing samples of fixed volume at regular time intervals, distribution of particle sizes can be readily determined.

An instrument recently applied for the determination is the centrifugal Micro-Particle-Classifier. For the test, 2g. of chocolate (defatted) are required, and 8 size classifications can be obtained in about 2 hr. by using different throttles for flow of air through instrument. Correlation with the sedimentation method is good, and time required for a single separation is about 15 min. less—*Chemistry & Industry*, 1369-76, 1954.

Food Fortification

Although artificial fortification of a nation's staple food was first proposed by the British government following Dunkirk, it remained for the American milling and baking industries to adopt the idea enthusiastically.

The proposal was endorsed by the Food & Nutrition Board of the National Research Council, and now applies to about 80% of the white wheat products used in the U. S. Success of the idea may be ascribed to support by both industry and academic science, aided by provisions of the Food, Drug, and Cosmetic Act.

Federal law and regulations are permissive, but if a manufacturer wishes to label his bread or flour as "enriched," each pound of the product must contain minimum quantities of thiamine, riboflavin, nicotinic acid, and iron, and may also contain vitamin D and calcium, the latter being required in self-raising flour. Other enrichments are permitted or practiced with corn foods, spaghetti and like products, white rice, oleomargarine, milk, and salt.

There is evidence of only a general character as to the benefits to public health resulting from food fortification, but there is agreement that the symptoms of deficiency diseases, formerly prevalent, have now disappeared.

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It is no longer possible to find enough cases of such diseases for purposes of instruction in medical schools.

Future food fortification will probably be adapted to the needs of each area. Addition of a proper selection of essential synthetic amino acids can be foreseen as a means of correcting the shortage of high quality animal protein which affects half the world's population. Imaginatively extended, food fortification may offer escape from the dire predictions of Malthus —*Food Manufacture*, (London) 472-75, Dec. 1954.

Liquid Cheese Composition

When comminuted cheese is heated and suitably mixed with gum tragacanth, water-soluble antioxidant, hexahydric alcohol solution, and water it forms an emulsion which, when homogenized, yields a stable liquid cheese product.

The product may be sterilized, packaged, and stored for long periods of time without separation of ingredients or deterioration of quality, taste, or flavor. The liquid is useful as a spread, dressing, sauce, or flavor.

A typical formula for a liquid Cheddar cheese of 16% butterfat content is: Cheddar cheese 50g., tragacanth 0.2g., water-soluble antioxidant 0.35g., hexahydric alcohol solution 3 cc., water 100 cc. Preferred antioxidant is Avenex, an oat-flour extract, and the preferred alcohol is d-sorbitol in a mixture known as Arlex.

Cheese is ground and placed in a steam-jacketed kettle at 150-160 F. Solution of other ingredients is added and the mixture is stirred until uniform. It is then homogenized at 800 lb. pressure, canned, sealed, sterilized at 240 F. for 40 minutes, and cooled immediately. The product is stable for long periods of time over a wide range of temperature—U. S. Patent 2,688,-553, Sept. 7, 1954.

Variegated Ice Cream With New Device

No moving parts are contained in patented apparatus for making ice cream in variegated color patterns.

The device comprises a suitable length of vertical 1½ in. dia. stainless steel tubing. Near the top is a lateral inlet through which plastic ice cream can be forced to fill the tube and pass downward through it. Flavoring material of contrasting color is introduced under pressure at the top and flows downward through three small delivery tubes that discharge into the center of the mass of ice cream.

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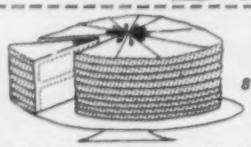

sugar syrup stabilization

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Spaced within the tube at 6-in. intervals are dispersing or pattern-making disks with apertures between arms that extend radially at angles of 90 deg. Number of disks, usually three, will vary with materials, operating conditions, and the desired pattern in finished product. They are disposed so that their radial arms are in different vertical planes. Two continuous freezers for the ice cream and the flavoring substance are adjusted to deliver their products at a ratio of 5:1 respectively.

In operation, ice cream and flavor start downward through the tube as a mass of basic substance containing three tiny cores of flavoring material. (The mass has a tendency to rotate as it is forced downward through the tube.) When it reaches the first dispersing or pattern-making disk it is broken up, and portions of the flavoring scattered through the basic mass.

The material reforms into a cylinder and travels to the second dispersing disk where it is again broken up, with further distribution of the flavoring material through the ice cream. Operation may be repeated with a third disk if necessary.—U. S. Patent 2,689,537, Sept. 21, 1954.

Preventing Chill Haze In Beer and Wine

Cloud in beer, wine, and fruit beverages, usually due to protein-tannin complex or tannic acid may be prevented by treating with polyvinyl pyrollidone.

A physico-chemical change occurs which results in a flocculent precipitate that settles rapidly and facilitates subsequent filtration. The polyvinyl pyrollidone is added to beer preferably at the time of racking down from the fermenters or when it is being transferred from warm to cold storage. Optimum amount is in the ratio of one part in 25,000 by weight.

The precipitate will carry with it traces of copper and iron which catalyze undesirable oxidation changes and give an off flavor, and organic reduced sulfur that develops offensive odors. Beer has enhanced foam formation, stability, and improved flavor. The polyvinyl pyrollidone is nontoxic, as demonstrated by its wide use, in medical therapy as a substitute for blood plasma—U. S. Patent 2,688,550, Sept. 7, 1954.

Fluoridating Process Water Does Not Inhibit Yeast

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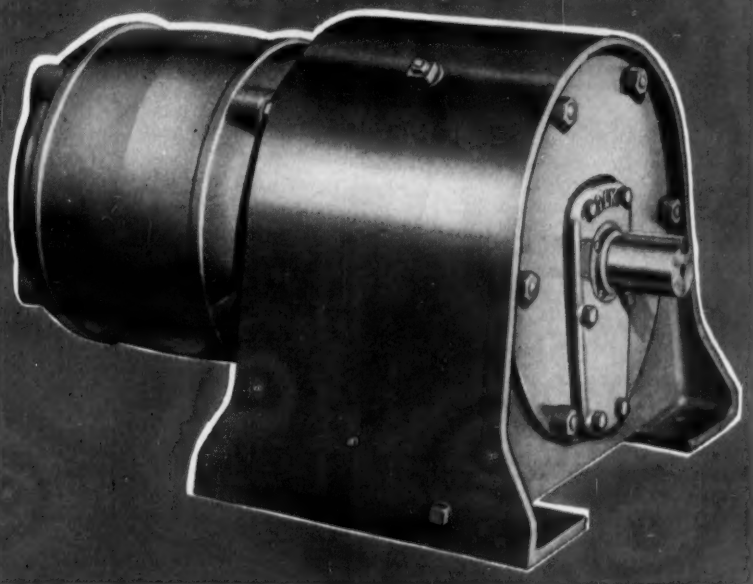

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In order to meet the greatest number of industrial application needs, the newly designed Integral Motoreducers are available in horizontal and vertical models, both in concentric and right-angle types; double, triple and quadruple reduction; horsepower range, 1 to 40 HP. Prompt stock shipment in standard ratios is offered.

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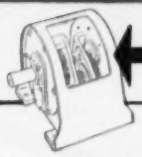

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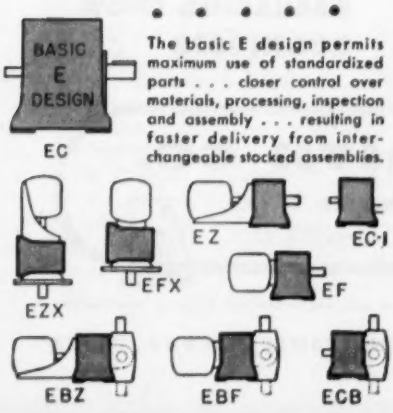

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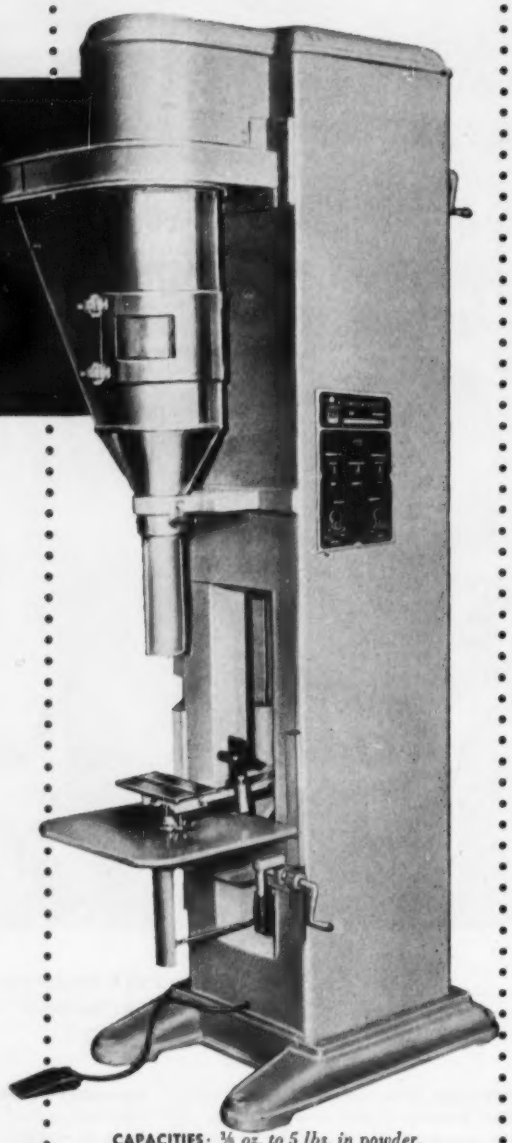

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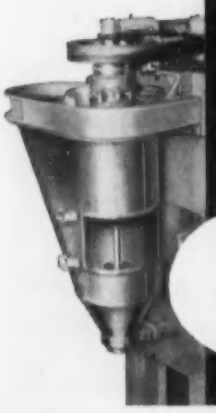

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of low concentrations, as in a fluoridated water supply, has not been studied extensively.

Slater (*Proc. Am. Soc. Brew. Chem.* 1951) observed a slight retarding effect up to 10 ppm. F and concluded that as much as 25 ppm. is undesirable in fermentations.

Experiments using NaF and Na_2SiF_6 in fermentations with yeast at 70 F., resulted in essentially the same attenuations, but latter gave more acid at the higher concentrations.

Up to 10 ppm. F there was practically no effect on fermentation, except for a possible slight stimulation at 2 ppm. At 20 ppm. the attenuation began to fall off appreciably and at 1,000 ppm. fermentation practically ceased. Successive fermentations at the same F level had similar attenuations, and there was no indication of a carry-over effect.

Results indicate that at 1 ppm. F (level adopted for fluoridation of public water supplies), there would be no effect on yeast activity, and, should faulty dosage admit higher amounts, as much as 10 ppm. would have no noticeable effect on yeast health—*Journal of the Institute of Brewing*, 427-30, Sept.-Oct. 1954.

Pentosanases Up Yield Of Starch From Wheat

In processing wheat for starch removal, gluten separation is troublesome, and about 30% of the starch is lost in the slimy "squeegee" fraction, a hydrated pentosan mass in which are embedded starch granules, nitrogenous substances and fibers.

By digesting the pentosans with enzymes (pentosanases) produced by several species of Bacillus, starch recovery is improved and the proportion of squeegee starch is greatly reduced.

Enzymes were prepared from *Bacillus pumilus, B. polymyxa, B. subtilis,* and *B. licheniformis* by 30-l. fermentations of a carbohydrate (sucrose or xylose), salts and distillers solubles (dried). Application of the enzymes increased recovery of starch from 76 to about 90%, and reduced squeegee starch from 16 to about 4%.

Protein and pentosan contents of recovered starch were reduced from about 1% to about 0.4% each. Effect of enzymes on starch properties has not been studied, but viscosities of hot pastes are not affected by enzymes of *B. pumilus* or *B. subtilis*. The enzymes are inactivated below pH 4.5 or above 8.5, and by temperatures above 115 F.—*Canadian Journal of Technology*, Vol. 33, No. 1, 33-40, Jan. 1955.

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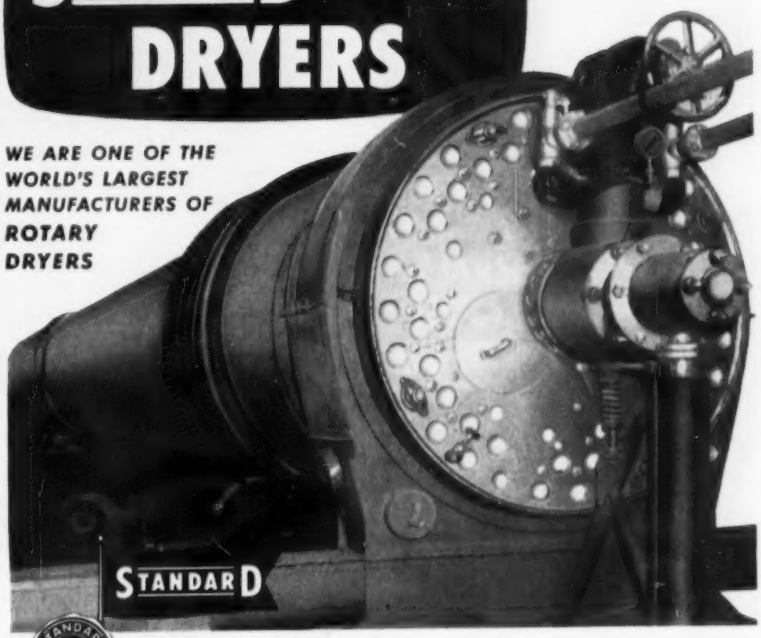

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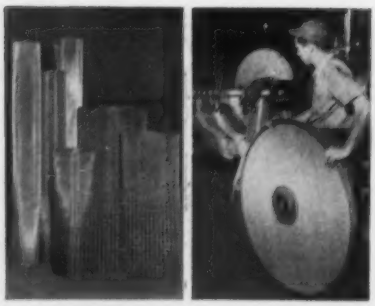

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Integrated Dual Line

—*Continued from page 91*

Separation of the candy-making room from the rest of the production floor is necessary because of the need of air conditioning (65 F.) for cooling and packaging operations. If, at any time, temperature and humidity rise beyond certain limits, faulty operations along one or more stages of the production line immediately takes place.

For example, the sizing machines may stick and choke. Or candy may stick and pile up on belts, in chutes, or hoppers. Or the packaging machines may not run properly.

Here's further evidence of the importance of temperature control: Prior to the use of air conditioning, most hard-candy plants had to shut down during late spring and summer.

In order to have the roll-packaging machine operate smoothly and economically, dimensions of the candy must be held very close. Thickness variation is not allowed to exceed 15/1,000 in., and somewhat less variation even than that is allowed in diameter.

It is, therefore, necessary to remove out-sizes at some point ahead of the packaging-machine hopper. Removal of these out-sizes is achieved by sorters, previously referred to in the description of the cooling room. Supplementing this monitoring is a visual inspection of the candy stream whereby chips and broken pieces, which have passed the sorter, are hand removed.

Recovering Rejects

Maintenance of such close tolerances naturally gives rise to the rejection of not inconsiderable quantities of candy. Utilization of this edible scrap, along with rejects from other phases of the process, has in the past presented a major problem in the proper economic operation of a hard candy plant.

At F&F, the problem has been solved by converting scrap into invert syrup, which is used in the formulation of the pre-melt syrup blend. The recovery process follows the usual methods of dissolving, carbon-decolorizing, filtering, and acid-treating of the purified syrup.

If circumstances permitted carrying inversion to completion, or near completion, the problem would be simple. However, complication arises from the fact that utilization of scrap must be brought into balance with production. The amount of invert syrup to be used in a pre-melt mix for any given formula is determined by its degree of inversion—the less inversion, the greater the quantity of syrup required. Hence, the degree to which the syrup is to be inverted will be governed by the rate at which scrap is a product in the plant.

Adequate control, in this case, requires rigid definition of concentration, temperature, pH, and reaction time. Frequent rapid checks of the solution are necessary, and here the polariscope has proved invaluable.

In practice, invert syrup is never used as such in making up the pre-melt mix. Corn and invert syrups are mixed in calculated proportions. And it is this corn-invert blend that the pre-melt operator meters into the kettles.

As at all times during cooking, sugar is susceptible to inversion, so the pH of this melt assumes great importance. In theory, the ideal pH is about 7.

But to prevent discoloration during cooking, it has been found necessary to keep the pH well on the acid side. This, of course, requires making allowance in the formulation for a certain amount of inversion after the raw materials are put into process.

Because of this cooking inversion, some variation in the reducing sugar of the finished candy is practically unavoidable. And it is one of the main objects of laboratory control to keep this variation within safe limits.

End (*Resume reading on page 92*)

Breaded Meats

—*Continued from page 77*

this pan, the batter is pumped to a distributing pipe atop the unit to fill a small reservoir resting over a stainless steel wire-mesh conveyor. Overflow from this conveyor forms a curtain of the batter mix through which the meats are conveyed for uniform coating on all sides.

Excess batter then passes through a stainless sieve as it flows back into the drip pan for re-circulation to the distributing pipe.

Following this thorough batter-coating, meats are directly conveyed to the breader. Here, meats move through a turning drum wherein they are completely coated with breading mix by a gentle tumbling action.

Conveyor-discharged from the breader, meats are then packed 40 or 42 portions (depending upon product) into foil-lined telescopic-type cartons. Finally, they are loaded onto portable racks and immediately transported into the quick freezer.

Meats packaged in this manner can be removed from a carton in the desired quantity without need of defrosting the remainder.

End (*Resume reading on page 78*)

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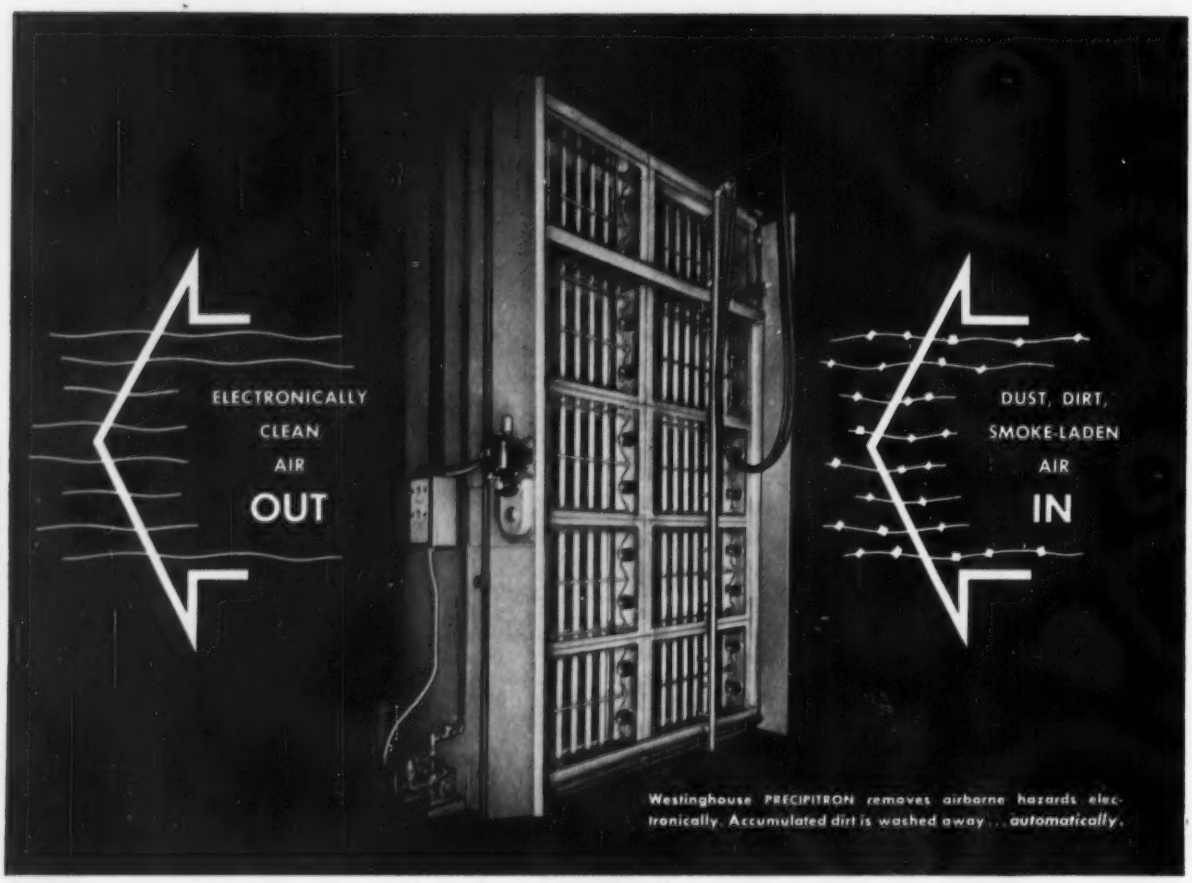

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Questions & Answers

THIS MONTH'S PROBLEM

Re Whipped Butter

Question — Our firm has been searching the field for a continuous method of manufacturing whipped butter. Could you provide us with processing details and specify the necessary equipment?

JANUARY PROBLEM

Batter Consistency Varies

The Question Was—Does anyone make an inexpensive viscosimeter for automatically measuring and controlling consistency of a batter mix? Employed in our shrimp-breading operation is a batter prepared by blending 2 parts of water with 1 part of batter mix, and we would like to maintain its consistency so that a uniform amount of batter will always coat the shrimp. But we run into trouble—our batter consistency changing every few minutes because of ice water melting from the shrimp.

Answer—Considerable progress in measurement and control of viscosity in food processing has been made in the last few years. Instrument manufacturers and food technologists have worked together, and have come up with some ingenious techniques.

One of the first commercial applications was the installation of a buoyancy-type controller on a large citrus juice evaporator. This operated a valve to recirculate the juice through the evaporator until desired density was achieved.

Viscosimeters using a rotating element immersed in the product (the drag on the rotor being proportional to density) also are being used. Another meter measures density by passing gamma rays through the product, and it can be used as a control. And still another has a sensitively calibrated floating plummet, the position of which depends on the density of the product. And by means of an induction coil, the position is detected to measure and control density (FE Oct. '54, p. 83).

Application of a viscosity unit to a new purpose requires instrument engineering, and we suggest that you put the problem up to your favorite instrument manufacturers.

Wishes to Can Beans

Question—We are planning to start a small experimental operation for canning red beans, kidney beans, and chili beans, starting with the dry products. Can you give us information on formulas, minimum pressure required, and length of cooking time? Our main concern is with No. 10 cans.

Answer—Beans should be cleaned of foreign matter—with special attention to removal of nightshade berries and dirt lumps. Air flotation or specific gravity separators may be necessary for the former, and washing for the latter.

Cleaned beans should then be soaked for a number of hours, steam blanched at 190-195 F., and passed over a picking belt before being filled into the cans. A ratio of about 50% soaked, blanched beans and 50% sauce is customary. However, you may wish to slightly adjust this, depending upon desired consistency of product, or upon cost factors.

We submit simple sauce formulas. However, various manufacturers naturally work out their own flavoring and seasoning combinations, which are considered confidential.

Red bean formula: Sugar, 27½ lb.; salt, 17 lb.; refiner's syrup, 1½ gal.; molasses, ½ gal.; and water, sufficient for 80 gal.

Kidney bean formula: Sugar, 15 lb.; salt, 12½ lb.; and water, sufficient for 100 gal.

Chili bean formula: Tomatoes (peeled), 25 gal.; dry chili peppers, 10 gal.; onions (ground), 10 lb.; salt, 7 lb.; and water, 12½ gal.

As far as thermal processing is concerned, we assume you will be using conventional non-agitating retorts. The following process times and temperatures have been suggested for #10 cans (we offer them as a guide only; for more accurate data, refer to your can supplier or The National Canners' Assn., Washington, D. C.): Kidneys, 120 min. at 240 F.; Red, 140 min. at 240 F.; and chili, 120-140 min. at 240 F.

As you know, cooling of this size can is best initiated under air pressure within the retorts. An air pressure of 11 psi. corresponds approximately to the internal can pressure at 240 F.

Following initial cooling, as air pressure replaces steam pressure during admission of cold water to the retorts at the end of the cooking cycle, final cooling can be carried out in conventional cooling canals.

Chunky Peanut Butter

Question—We are considering making a peanut butter of the so-called nut-chunk type. Can you briefly describe how this is best done?

Answer—There are at least two different methods, the choice depending on product characteristics desired. If a wide range of sizes of nut particles is satisfactory, and if the butter does not have to be finely ground, then it is feasible to use special plates in an attrition mill or special comminutor with screen opening large enough to pass particles.

But another technique is called for if you want the particles to be of more uniform size and the peanut butter base itself to be finely ground. Here, the butter may be prepared by the conventional method, using whatever type of grinding mill and fineness you choose. Nut chunks will have to be prepared from whole or split-roasted blanched nuts of the desired variety by means of a nut granulator—a standard piece of equipment. For best results, care must be taken to keep the knives properly sharpened.

The particle size will, of course, be determined and controlled by the specifications of the sifting screens processing the granulated nuts. Arrangements can be made to return over- and under-size material to the butter process for fine milling, to avert yield loss.

Q.—How can we eliminate foaming on our 120-per-min. bottling line?

A.—Reducing the speed of your filling machine will probably solve your problem. In the event that you are using a vacuum filler, it is possible that the vacuum is too high. Also look into the possibility of increasing the diameter of your filling tubes.

How Would You Do It?

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Flavoring and stabilizing ingredients can be added to the butter by conventional feeders, with quantities adjusted to give correct percentages in the finished product after allowing for weight of added nut granules. A vibrating feeder or revolving pocket feeder will generally handle the nut chunks satisfactorily. The proportion added is a matter of consumer taste and acceptance, as there is essentially no cost factor involved.

The butter is a hot fluid when finely milled, and the chunks can be mixed into it on a continuous basis with a cut-flight type of screw conveyor. Or mixing may be accomplished by introducing both ingredients in desired proportions to a hopper feeding the suction of a high-capacity recirculating pump.

Coating Pineapple Cubes

Question—Can you give me formulas and procedures for coating pineapple cubes with chocolate? Please give type and composition of dipping chocolate.

Answer—Coating pineapple cubes with chocolate presents problems which are essentially due to the moisture in the fruit. It is taken for granted that the pineapple you refer to is not raw but of the processed, sugar-glazed variety.

It is important that syrup or juice be drained from the pineapple cubes and that the surface be given some skinning or drying action before the pieces are coated. It is also important that the pieces be so conditioned that they will not be subjected to temperature differences of 20 deg. F. to avoid condensation under high humidities.

If moisture can be avoided, there will be very little difference in coating pineapple cubes other than the general tempering procedures for chocolate. Should moisture be a problem, slowly temper the chocolate to a very mushy stage (usually around 83 F.) and then slowly bring the temperature up to 88-89 F. for enrobing. It is important to enrobe at a lower temperature so as to have fairly high viscosity chocolate in order to get a coverage of over 35% chocolate.

Dark bittersweet coatings are usually good with glazed fruits, but more, however, are coated with light or milk chocolate coatings since they appeal to women and children.

If you consult your chocolate-coating manufacturer, I am sure that he will suggest a coating that will have a fairly high viscosity which will also be very finely milled.—*Justin Alikonis, The Al-Chem Laboratory, Inc., Bloomington, Ill.*

Making Soup Bases

Question—Please give us some information on preparing beef and chicken soup bases for the institutional trade?

Answer—It is somewhat difficult to choose one formula for chicken concentrate or beef soup concentrate and classify it as typical, because there are so many. But the following can be considered as fundamental:

The soup base is composed of seasonings and fat. Most common seasoning ingredients for chicken soup base are onion powder, 5%; toasted onion powder, 1.5%; celery powder, 14%; garlic powder, 0.25%; glutamate, 12%; pepper, 0.25%; salt, 30%; starch, 21%; and cerelose, 16%. Dehydrated parsley leaves, cardamom, coriander, clove, and thyme may be optional ingredients.

To 75 parts of seasoning, add about 25 parts of fat. The fat can be all hydrogenated vegetable fat or a 75% vegetable and 25% chicken fat. If no chicken fat is used, turmeric should be included in the seasoning to impart a yellow color to the soup. The fat should be added chilled.

Blend seasoning and fat in a Hobart-type mixer, and continue mixing until batch becomes a homogeneous mass. Into a suitable package, add 1 oz. of soup base and 1½ oz. of noodles, with dehydrated chicken meat as an optional ingredient. Contents of this package, when added to a quart of water and heated, is ready to serve.

Beef-soup mix is prepared in much the same manner except that the base itself is different.

A typical formula would be: Glutamate, 5%; hydrolyzed vegetable protein, 10%; onion powder, 8%; celery, 9%; garlic powder, 0.25%; paprika, 1%; caramel coloring, 2.75%; salt, 31%; starch, 17%; cerelose 17%.

Formulation and blending procedure is the same as for chicken.

Q.—From a ton of raw tomatoes, what is the average number of cases that can be expected for the following sizes of tomato ketchup: 12 oz. extra standard, 12 oz. fancy, and 14 oz. fancy?

A.—Since grade standards specify total solids (including sugar), and since the solids of tomatoes vary somewhat with weather, maturity, etc., we doubt if there are figures that will mean much. But we do know of a firm with a usage factor of 32.4 lb. of tomatoes per case of 14-oz. pack (dozen bottles) of U. S. fancy ketchup. Here, yield per ton amounts to 61.7 cases.

Will It Spoil?

Question—We are contemplating setting up a tomato juice and sauce plant, using tomato paste (38% solids) as our raw material. Sauce or juice will be heated in a V-15, 10-ft. Chisholm-Ryder heat exchanger at a maximum temperature of 210 deg. F. Products will then be immediately filled in 5½-oz. and 12-oz. cans, closed, processed in an open-coil, steam-exhaust box for 3-5 min. at 212 deg. F.; held at room temperature for 3 min.; and loaded into a spinner cooler. Will this process be sufficient to prevent flat-sour spoilage (by B. thermoacidurans), considering that the raw material had been previously sterilized during concentration?

Answer—Proposed procedure you outline for packing tomato juice and sauce from tomato paste is not sufficient to prevent flat-sour spoilage, even though the basic raw material might have been previously sterilized by concentration.

There is always the possibility of contamination with flat-sour organisms from equipment. And these organisms will cause spoilage even though the original product did not contain them.

We suggest that you follow the recommendations suggested in Bulletin 27-L of the National Canners Assn.

Bubbles in Jelly

Question—We've had considerable difficulty due to formation of air bubbles in our apple and crabapple jellies. If possible, we would like to eliminate these bubbles, since they detract from appearance of the product.

We use vacuum pans to cook our jellies, which we make in 1,000-lb. sugar batches. Product is heated in pans to 200 F., then air-blown over to our filler, where it goes into containers within ½ hr. after the blow-over.

Jars are sealed by White capping equipment, and we try to hold our vacuum at an absolute minimum by cutting down amount of steam put into the capper. From there, jars go to a cooler, where they are brought down from 200 F. to approximately 110 F. in 15 min.

Setting time is anywhere from 3 to 4 hr. Therefore, the jelly is still liquid when packed. As for head space in the jars, we have a flapper (preceding our capper) that knocks off the foam and gives us a fairly constant headspace in all jars.

Bubbles do not form until after the jelly has set for at least one day.

Made with the skill that assures protection

This 17th Century Gauntlet typifies the skillful craftsmanship of medieval armormakers. The expert positioning and attachment of adjacent parts permit all the necessary flexibility. The intricate carving and embossment give it a distinct, attractive appearance. And the careful design and workmanship assure the maximum protection. In battle and in jousts, combatants had to depend on the armorer's skill . . . often for their lives.

J&L Steel Containers offer dependable protection for your products. They're built of sturdy, high-quality J&L Steel Sheet. Their careful construction insures perfect fit of all joints and movable parts. And they have a trim appearance which can be attractively decorated with colorful designs and illustrations by J&L's accurate lithographic process.

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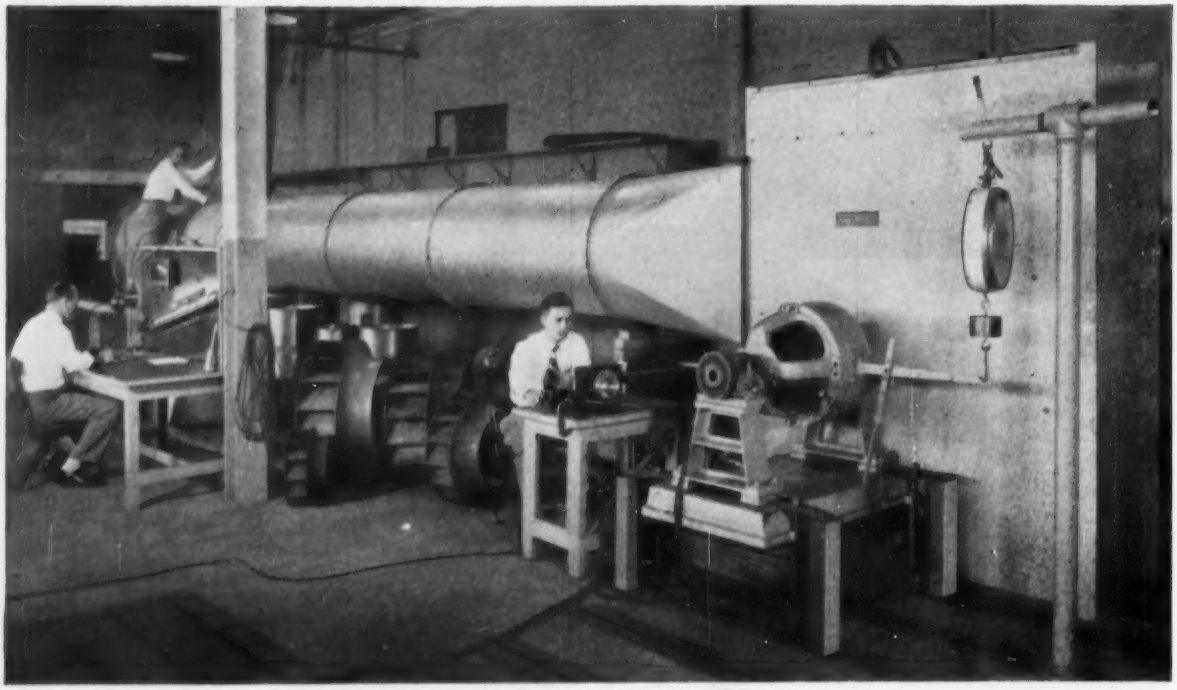
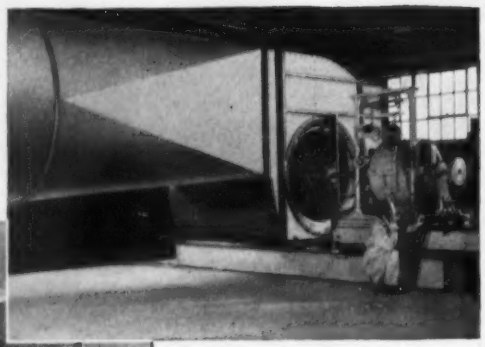


Testing fan wheel performance in the "Buffalo" Laboratory

WHY "BUFFALO" FANS PERFORM* AS SPECIFIED

What will this wheel design deliver at various static pressures? What are the horsepower requirements? Noise level? And what's the best housing? Endless testing like this in the "Buffalo" Laboratory — plus endless designing and redesigning — brought you the famous high-performance Type BL Limit-Load Ventilating Fan — and will continue to bring you the latest and finest in fans. You can expect this inbuilt performance whenever you order a "Buffalo" Centrifugal, axial flow or propeller fan.



WHERE WE TRY TO DESTROY WHEELS — the "Buffalo" vacuum test pit where wheels are revolved at many times their operating speeds to discover — and correct — any point of structural weakness. Further assurance of a better fan buy when you specify "Buffalo".

ALL TESTS in the complete "Buffalo" laboratory are conducted in strict accordance with the test code adopted jointly by NAFM and ASH&VE.

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Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING
FORCED DRAFT COOLING HEATING PRESSURE BLOWING

Right after packing, however, the jelly is perfectly clear.

Answer—We suggest you carefully review your filling operation to reduce entrapped air to a minimum. Amount of air remaining in the hot jelly after cooking under vacuum and heating to 200 F. should certainly be very small. And steady air pressure on the surface of the batch to force it from the pans would not be apt to incorporate much additional air.

So what air you do have present seems most likely to be the result of filling jars too fast, perhaps with some attendant splashing. A slight modification of the filler spouts, experimentally determined, might minimize air entrapment at this point.

Next you might try filling at a slightly lower temperature than 200 F.—say 185-190 F. This would lower the final vacuum, which as you have indicated should reduce bubble formation. If you hesitate to use the lower temperature for fear the caps may be insufficiently sterilized, it should not be difficult to heat them, after their application, for the few additional degrees by infra-red lamps or hot water sprays at the inlet end of your jar cooler.

Q.–During this past winter, we've had numerous complaints on oil separation as well as "cheesy"-textured salad dressing.

A.–It seems to us that your salad dressing froze either during shipment or warehouse storage. We'd suggest that hereafter you make sure that shipments are made in insulated or heated trucks and that lots be stored in a moderately heated warehouse.

Finally, you may have to slow down the setting rate of your jellies still further, in order to provide more time for the bubbles to reach the surface and disappear. This may require use of a buffer salt. Presumably, these two jellies—apple and crabapple—have no added pectin, but quite likely you do produce others that do require pection additions. If so, your pectin supplier might be able to give you some helpful advice about the relation of pH to setting rate.

Checking Freezer Burn

Question—What is freezer burn, and how can it be retarded?

Answer—Freezer burn refers to dehydration or loss of water from frozen products.

It can be inhibited by wrapping products to be frozen in films with a low moisture vapor-transmission rate. The film must be tightly wrapped to minimize air space between wrapper and surface of product.

There are many suitable wrappers available. For example, there's a 40-lb. kraft paper, waxed on both sides. One good thing about this paper is that it easily strips off after removal of the product from the freezer.

More recent is a polyethylene-coated paper—a 40-lb. bleached kraft coated with 8 lb. of polyethylene.

Preparing Fish Cakes

Question—We manufacture a line of packaged delicatessen items sold from refrigerated display cases. To extend our line, we'd like directions for making fried fish cakes. Can you help us?

Answer—Soak 12½ lb. of shredded salt cod for 3 hr. in cold water. Then shred and introduce fish into steam-jacketed kettle, and add water. Heat to boiling and drain off water.

Now boil the fish with fresh water plus 22½ lb. of potatoes until well done. Drain water and grind fish and potato mix through a ¼-in. plate.

Blend thoroughly ground fish and potatoes in a vertical-type bowl mixer along with 20 lb. of beaten eggs, 1½ lb. of butter or margarine, 2½ lb. of diced onions, and ¾ oz. of pepper.

Form mixture into cakes, dip into beaten eggs, roll in bread crumbs, and fry until light brown. Package and hold in 40-deg.-F. refrigerated display case.

Nut Fudge Formula

Question—Do you have instructions for making Brazil nut fudge kisses?

Answer—Heat 250 lb. of fondant to 125-130 deg. F. in a warm mixing kettle. Then add 40 lb. of long shred, desiccated coconut; vanilla flavor; 10 oz. of salt; and 20 lb. of sliced Brazil nuts. Mix these well.

Meanwhile, boil to 260 deg. F., with constant stirring: Corn syrup, 25 lb.; hard coconut butter, 8 lb.; invert sugar, 15 lb.; sugar (fine granulated), 35 lb.; and condensed milk (sweetened), 45 lb. Pour batch into the fondant-coconut-Brazil nut mixture. Mix for about 10 min. or until

Q.–What can we use to control activity of undesirable microorganisms in grapes that are to be used for making wine?

A.–Add 4 oz. of potassium metabisulfite per ton of grapes.

NEW

EFFICIENCY and SANITATION in the INSPECTION CYCLE

of processing lima beans, cut beans, mushrooms, diced carrots

the NEW Robins "ROLL-OVER" INSPECTION TABLE

UNIQUE ROLL-OVER ACTION increases efficiency of inspectors—a factor in quality and appearance of your finished product. Flexibility of design permits "custom assembly"—into any desired width and length—and with as many turn-overs as required.

Belt is of non-absorbent Neoprene; all other contact areas are of stainless steel. Turnover pulleys are of stainless steel materials. All other pulleys are of the solid seal sanitary drum type.

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Manufacturers of Food Processing Machinery Since 1855

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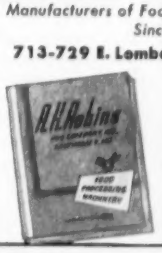
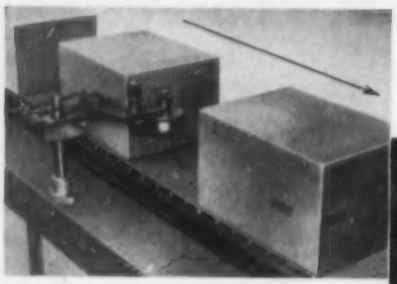


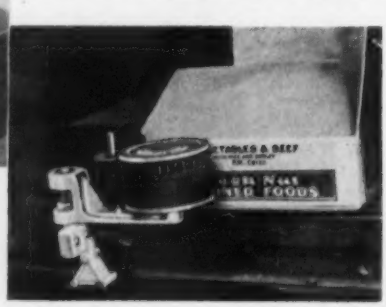
For 100 years, food processors have consulted Robins on equipment, methods and processes. Robins engineers have helped design many of today's most modern plants.

For equipment and supplies—consult the Robins catalog. For assistance or advice on a production problem, or for service on equipment, a Robins field engineer can help you. A wire or phone call will start a man, a catalog—or both—on their way to you.

Low-cost marking attachment pays for itself in weeks... saves thousands of $ every year



◀ ROLACODER twin-action markers ...for imprinting codes and lot numbers on 2 or 4 sides of cases simultaneously ...without requiring cases to be turned.



Friction-driven ROLACODER markers do your marking automatically... save cost of manual stencilling or stamping. Designed for easy do-it-yourself installation on existing conveyor lines, case-sealers, etc. They use quick-change rubber type or dies, hold 8-hour ink supply.

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batch is sufficiently firm to be spooned into kisses or deposited in rough pieces on heavy waxed paper.

This batch can also be spread onto oiled or waxed paper, marked, and cut like fudge.

Fondant is prepared by boiling to 246 deg. F.: Sugar, 240 lb.; corn syrup, 60 lb.; invert sugar, 30 lb.; and water, 60 lb. Syrup is cooled to 125 F. and beaten into fondant.—*Formula by Brazil Nut Association, New York City.*

—End—

Premium Price Success

—Continued from page 79

They consist of individual compartments, each with a top-entering duct. Tapering upward from each bin, these ducts form a circle beneath a rotating distributor head and spout. Fed by the stoner system, this unit enables specially roasted batches to be stored separately for subsequent blending.

Coffee is directed to a particular bin by a mechanical selector rig at floor level. Through a series of linkages, the distributor spout may be positioned directly above that duct which fills the bin. Operation is then automatic, with a high level indicator controlling the shut-off.

Control Panel

Discharge from the bins is through ducts that converge into a blender scale hopper below floor level. Bottom of each compartment is closed by an air-operated slide valve which operates in conjunction with two solenoid valves. These in turn are controlled by a toggle switch on an adjacent control panel. Each bin is represented by a station on this panel.

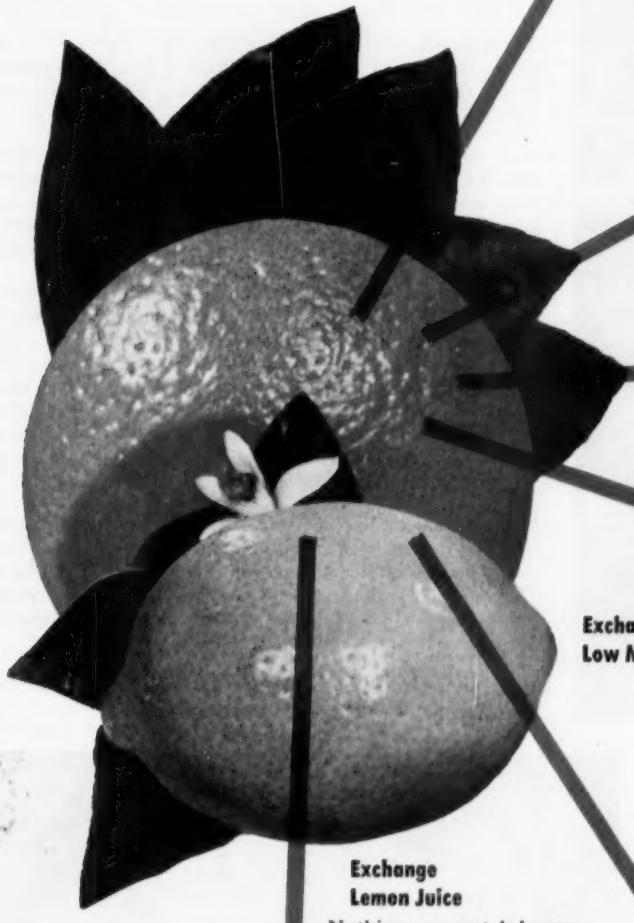
The toggle switch energizes one of the two corresponding solenoid valves to permit air pressure either to open or to close the slide valve. Thus to draw from any bin, the operator simply throws the proper switch and observes the scale indicator. When the proper amount is withdrawn, he closes the valve on that bin and proceeds to the next one.

In addition to the toggle switches, the control panel is equipped with three indicator lights for each compartment. A green light flashes when the bin is full, a red light when it is empty, and an amber light when the bin is discharging. These lights are activated by high and low level indicators in each bin.

The blender scale hopper holds a batch of 2,400 lb., which is sent to the blender by screw conveyor and

Look to Sunkist
for progressive research in food processing

Yes, in every field of food processing, the Sunkist Growers laboratories are making ever-widening contributions to the increased quality of food products. Here are some typical Exchange Brand product developments.



Exchange Oil of Orange

Always consistent, always outstanding in flavor, strength and aroma. An essence you can rely on. Made from fruit grown in the famous Sunkist groves of California.

Exchange Oil of Lemon

The 4-to-1 favorite over all other lemon oils combined! The reason is the superior flavor that comes only from California-grown lemons processed by exacting Sunkist standards.

Exchange Preserver's Pectin

Here is *even* jell strength that gives you consistent, complete reliability in setting control.

Exchange Low Methoxyl Pectin

A natural fruit pectin that jells without sugar. Completely tasteless, permitting the use of the most delicate flavors. Pies made with Exchange Low Methoxyl Pectin won't "run" or "weep" when cut—and you have never tasted such natural juicy fruit flavor. Famous too for aspics, jellied fruit or vegetable salads, dietetic preserves or non-sugar jells.

Exchange Lemon Juice

Nothing can match lemon juice for bringing out the natural flavor of *any* food product. It's a superior acidulant in the preparation of mayonnaise, fruit cocktail, figs, fruit nectar, prunes and other heavy-syrup products. Highly effective as an anti-oxidant in processing frozen foods. Citric acid molecules have also been established as effective in the retarding of mold growth. Available in concentrated or single strength form.

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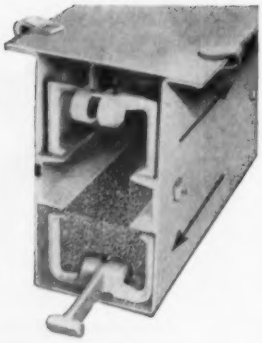
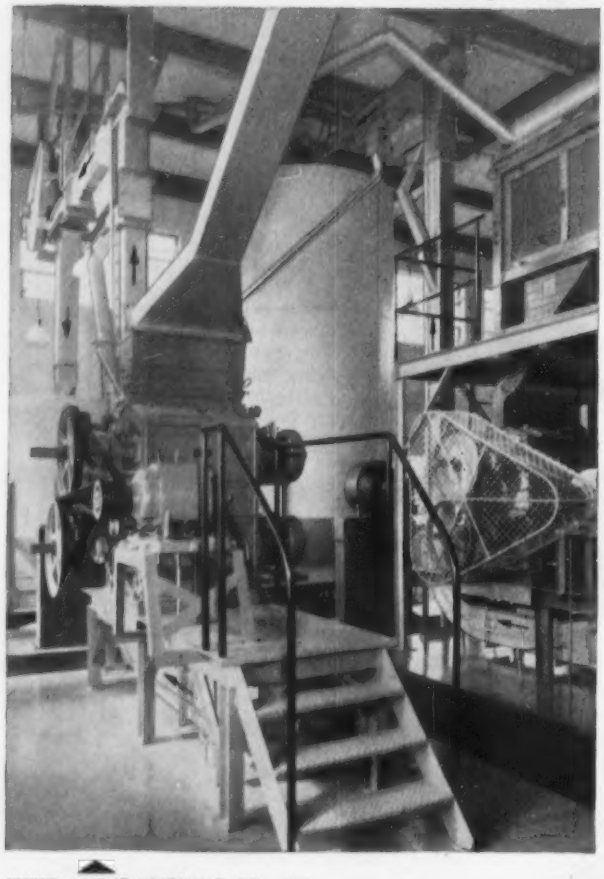


MALT MOVES THE MODERN WAY

– without Dust or Contamination – in a Compact, Self-Cleaning Conveyor-Elevator System



Any housewife would be proud to have her kitchen as clean as the interior of the Lucky Lager Brewery at New Westminister, British Columbia. Yet 5 tons of malt and rice pass through grinding mills in this room every hour.

With absolute cleanliness a must, the S-A REDLER Conveyor-Elevator System that moves the materials selectively from storage to surge bins and from grinding mills to weigh hoppers, seals dust in, seals contamination out. The entire system operates with a minimum of supervision or attention.

Flexibility in layout was also an important factor in the selection of REDLERS when handling methods at the brewery were modernized. REDLERS in this plant include "L", "Z" and horizontal units. Because of their compact design, they require minimum space and structural support. One unit, which handles both rice and malt, has web-type scraper flights that provide complete clean-out after each product is carried. This permits precise blending while making maximum use of the conveyor system.

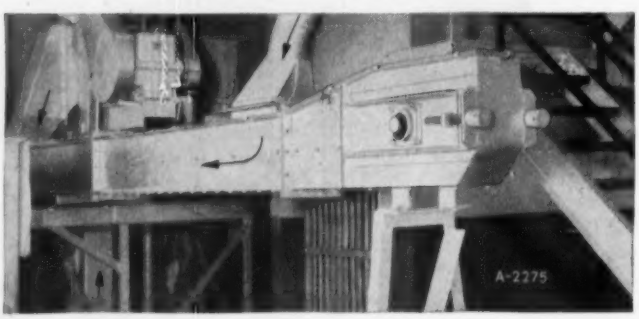
For your modern, low-cost answer to bulk handling of granular, flaky, pulverized or small, lumpy materials—without dust, contamination or degradation—investigate S-A REDLERS. They are self-feeding, can be choke-fed without jamming; they cut power costs through smooth, in-mass movement of dry bulk materials.

Write for a copy of REDLER Catalog No. 140—or ask that an S-A engineer bring you all the details.

LUCKY LAGER BREWING CO., LTD.

At left, Z-type REDLER moves rice from mill to weigh hopper. REDLER malt handling system is at right. Both REDLERS are 7-inch units and handle 5-tons per hour each. Other REDLERS in plant handle as much as 28-tons per hour through a total lift of almost 100 feet. Cross-section at top shows a standard REDLER.

This REDLER handles both malt and rice. To permit accurate blending, web-type scraper flights completely clean the casing after each run to prevent mixing.



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Sealmaster Division
A complete line of industrial ball bearing units available in both standard and special housings.

bucket elevator. Blending takes about 15 min., whereupon the batch is dropped to a bin below floor level. From there, bucket elevators feed blended coffee to the grinders.

The grinders' five sets of rolls break the beans into a range of particle sizes. To assure correct proportions of the different-size particles, a special sieve test was developed and is performed at regular intervals at the grinder. In this test, a weighed sample of ground coffee is put through a series of screens of different mesh. The weight of coffee retained on each sieve is recorded, converted to a percentage, and compared with the established standard.

When necessary, the rolls are adjusted to assure maintenance of the fixed ratio of grinds. In addition, changes in atmospheric conditions call for roll adjustments to maintain the 4,800 lb. per hour capacity of these units.

Ground coffee goes to stainless steel storage bins (4,000 lb. capacity) on the roof. Feed to a 6-spout filler is by gravity, with vibrator units on the side of the bin preventing stratification. Fillers have a capacity of 66 to 72 1-lb. cans per min.

A vibrating pan in the filler feeds ground coffee to hoppers. These automatically discharge into the filling spouts when exactly 1 lb. of coffee collects in them. For checking accuracy of fill, however, an under-and-over scale is employed on the line.

Cans are then sealed under vacuum and cased automatically.

Unique Rating System

In addition, this company has a unique external check on quality. Before entering the coffee field as a producer, Chock Full O' Nuts established a chain of restaurants in New York City. To get an accurate cross section of each day's roast, every tenth case of coffee is set aside for the restaurants.

Coffee is scored daily by restaurant managers. And this provides a rapid check of consumer acceptance—a very effective supplement to the quality control program.

End (Resume reading on page 80)

Compressed Air Leaks

—Continued from page 85

essential, with a uniform pitch in each line down to the line end. To obtain this there is often required an adjustment of straps, rollers, or other hangers.

As lines are checked for alignment and drop, each take-off should be inspected. These branches should exit from the top of the main pipe, passing through a wide return-bend for the drop to use-level.

All fittings, couplings, L's, reducers, unions, and valves should be examined for leaks. Don't trust the ear alone—apply soapy water and watch for bubbles.

Repair all leaks. The very smallest one may mature into an extremely costly grown-up leak all too soon.

Don't overlook the packing around valve stems. Most leaks here are ended by tightening packing nuts. Sometimes, however, repacking is required.

In plants where blow guns are used for clean-up, or other purpose, do not use a globe valve for turning air on and off. Instead, employ only a normally closed control which will shut off air when the pressure of the operator's finger is released.

Also be sure that the size of this outlet nozzle or orifice is the smallest possible to accomplish the objective.

Further, wherever hose is employed, check on and discard all leaky sections. Expense of leaky hose can in a short time more than offset the cost of new hose. Check next on all connections, particularly on hose fasteners. Considering factors of both waste and safety, only two general standard types are satisfactory. Don't forget that a threshing hose is a menace, especially when metal-ended. So be sure that no "home-made" hose clamps are used. Instead, employ only wire and bolted types that are approved.

End (Resume reading on page 86)

Advanced Oil Extraction

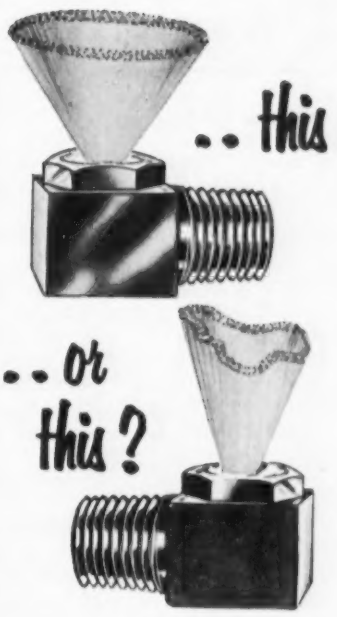
—Continued from page 83

Steam is provided by a "package type" 300 hp. boiler (Powermaster) operating at pressures up to 200 psig. The unit is entirely automatic and can be run on either natural gas or fuel oil. The original 150 hp-automatic boiler (Cleaver-Brooks) is held in reserve. As a fire precaution, boilers are located 60 ft. from the extraction facilities with steam supply lines underground.

Water for cooling and steam generation is pumped from the Sacramento River, some 500 ft. away. Temperature of this water never exceeds 75 deg. F.

The tank farm has storage facilities for 64,000 gal. of crude and filtered rice bran oil, equalling total capacity of eight railroad tank cars. Adequate facilities are provided to load out oil in tank cars, tank trucks, or 55 gal. drums.

End (Resume reading on page 83)



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Useful New Books & Government Publications

People In Industry

PERSONNEL RELATIONS. *By Arthur M. Whitehill, Jr. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36. 1955. 526 pages. 6¼ x 9¼ in., cloth. Price:* $6.00.

The system of relationships, procedures and techniques of human administration in business are thoroughly, yet compactly, discussed in this book. The role of the administrator and his application of human relations skills in solving problem situations in his organization is closely integrated with the entire coverage of the subject.

Recent advances in the administration field get full up to date coverage as in the section on the influence of economic, social and political "climate" on effective administrative leadership.

The author has interpreted personnel relations as planning, integration and direction of human resources in industry.

Management Publications

Three new publications have been issued by the Research Division, California Personnel Management Assn., Berkely 4, Calif. Each is a stenographic brief of an address given before the organization. Price of each paper-bound booklet is $1.00.

THE ANNUAL WAGE DRIVE AND UNEMPLOYMENT INSURANCE. *(No. 224). An address by Frank Foisie, vice-president of the Federated Employers of San Francisco.*

AMERICAN BUSINESS LEADERSHIP IN THE DECADE AHEAD. *(No. 210). Address given by Ordway Tead, Harper & Bros.*

COMMUNICATING IN BUSINESS. *(No. 202). A talk given by E. F. Fitzmaurice, product service manager, General Foods Corp.*

The New Consumer

THE CHANGING AMERICAN MARKET. *By the Editors of Fortune. Published by Hanover House, 575 Madison Ave., New York 22. 1955. 304 pages. 8¼ x 5¾ in., cloth. Price:* $4.50.

The hinge on which much of our economy hangs, the preferences and ideas of the American consumer are still relatively unpredictable and changeable. Food processors, dependent as they are on the likes and dislikes of the buying public, should be particularly interested in this treatment of the recent and great changes in the American market.

This authoritative book discusses the powerful new middle class which has been tripling American expenditures. The rise in the amount of money spent on food received particular attention.

Illustrated with charts and graphs, the work includes an appendix which offers valuable and up-to-date data on the expenditures of the American public.

Engineered Agriculture

AGRICULTURAL PROCESS ENGINEERING. *By S. M. Henderson and R. L. Perry. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, 1955. 402 pages. 5¾ x 8¾ in., cloth. Price:* $8.50.

This book covers the engineering elements involved in the processing of agricultural products. Such procedures and devices as cleaning and sorting, refrigeration, air conditioning, concentration by evaporation, drying and dehydration, mixing, steam generation and use, plant layout and work simplification are definite interest to the man in the food field.

Working from both a descriptive and analytic angle, the authors have succeeded in presenting a treatment which is both complete and comprehensive.

Booklets and Reports

SHARING IN OUR EXPANDING ECONOMY. *(No. 107 in Financial Management Series) Published by American Management Assn., New York 36. 35 pages. Paper. Price: $1.75. Guide to planning and financing company progress.*

SYMPOSIUM ON ODOR. *Published by American Society for Testing Materials, Philadelphia 3. 88 pages. Paper. Price: $2.25. Papers presented at a 1954 meeting in Chicago.*

COMPANY EXPERIENCE IN IMPROVING PACKAGING EFFICIENCY. *(No. 45 in Packaging Series). Published by American Management Assn., New York 36. 48 pages. Paper. Price: $1.25. Discussion of packaging function in four companies.*

FOOD COMPOSITION TABLES—MINERALS AND VITAMINS. *Published by Columbia University Press, New York 27. 117 pages. Paper. Price: $1.00. A report by Food and Agriculture Organization of the United Nations.*

DAIRY AND POULTRY STATISTICS 1953. *Published by USDA, Washington, D. C. 125 pages. Paper. Price: $.45. Annual summary of market statistics.*

FE REPRINTS AVAILABLE

Listed below are special sections, flowsheet book, and articles from past issues of FOOD ENGINEERING which are available in reprint form. Single-copy prices are listed. For orders of 2 or more, there is a 25% discount. You order the reprints by circling the corresponding numbers on the Reader Service Coupon, inside the back cover. You will be billed when your order is filled.

1. Meat Special.....$1.25

Contains a series of 9 articles: (1) Cold Sterilization Problems. (2) New Continuous Lard Process. (3) Progress in Meat Dehydration. (4) High-Speed Chub Packaging. (5) Atomic Irradiator Designed. (6) Improvements in Unit Tasks. (7) New Processes for Old Products. (8) Map Unravels Delivery Snags. (9) Saves 50% of Retort Steam.

2. Dairy Special.....$1.25

Ten timely articles are included: (1) Dairymen Face Challenging Changes. (2) New Processes for Instant Dry Milk. (3) Controls Presage Automatic Dairy (4) Save With Cleaned-In-Place Pipes. (5) Bi-Oxidation Solves Waste Problem. (6) Cheese Keeps in Antimycotic Wrap. (7) Plastic Tank for Milk Trailers. (8) Bulk Handling Aids Processors, Too. (9) Advanced Dry Milk Flowsheet (10) "Tracers" Detect Foreign Fats.

3. Ingredient Special.....$1.25

Ten articles helpful in improving product formulation: (1) Chemicals Still a Question. (2) Role of Antioxidants. (3) MSG —Unique Enhancer. (4) Tailored Salts Add Values. (5) Ascorbic Acid Betters Meats. (6) Dry Solubles Are Versatile. (7) Sugar Types and Uses. (8) Latest on Low Calories. (9) True-Fruit Hows and Whys. (10) Stepping Up Nutrition.

4. Packaging Special.....$1.25

Six articles of practical value: (1) Flexibles Are Revamping Packaging Pattern. (2) How To Avoid Damage in Shipping. (3) Bundling Frozen Foods. (4) One-Portion Packets. (5) Automatic Packaging Line. (6) Paper Vs. Glass.

5. Canning Special.....$1.25

Eight articles on significant developments: (1) High Frequency Looms as Improved Cooking Method. (2) New Twist in High-Short Retorting. (3) Full-Flavor Concentrates by New Recovery Technique. (4) From Orchard to Cannery—Under Water. (5) At Gerber's Quality Control Reigns Supreme. (6) Bulk Brining Spells Big Benefits to Canner. (7) Top-Notch Tomato Processing Operation. (8) Dual Tomato Cannery—How It Ticks.

6. Book of Flowsheets.....$2.00

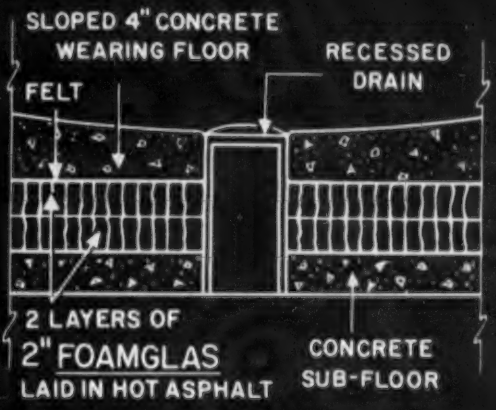
Few copies of 1949 edition still available. It contains 120 process charts covering a wide variety of food manufacturing operations. Charts are accompanied by brief descriptions of the processes.

7. Preventive Maintenance.....$0.50

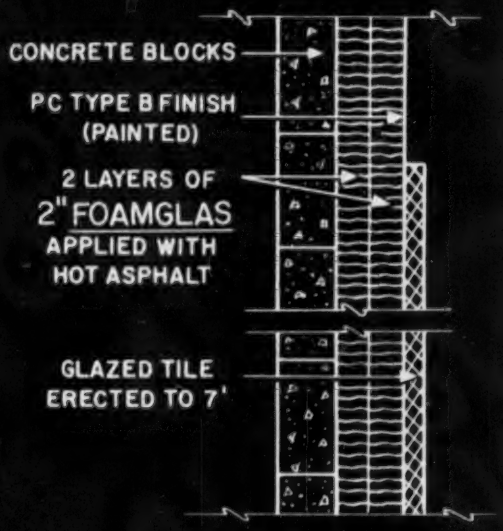
An 8-pager packed with information that will help to minimize costs, reduce down-time, and promote quality through more effective maintenance.

FOAMGLAS®

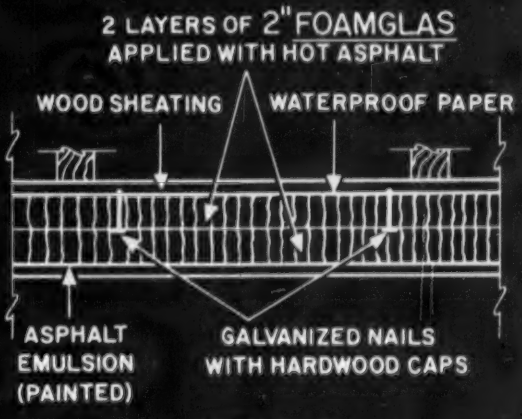
the cellular, stay-dry insulation



DETAIL C
TYPICAL FLOOR SECTION



DETAIL A
TYPICAL WALL SECTION


2 LAYERS OF 2" FOAMGLAS APPLIED WITH HOT ASPHALT
WOOD SHEATING
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GALVANIZED NAILS WITH HARDWOOD CAPS

DETAIL B
TYPICAL CEILING SECTION

"FOAMGLAS insulation proved it stays dry by stopping seepage into our cooler"

reports H. S. Moore, Bohrer & Moore Packing Company, Wapakoneta, Ohio

Use of FOAMGLAS insulation has benefited an Ohio meat packer in several unusual ways. Harry Moore of Bohrer & Moore Packing Company explains it this way:

"We built an addition for a meat cooler and two freezers back in 1950. The back walls of the cooler and one freezer are about four feet below grade. The cooler was completed first. We had a lot of trouble with seepage through the uninsulated wall of the cooler. Later we installed FOAMGLAS on the inside walls of the freezer and we haven't been bothered again with seepage."

Mr. Moore also gives his cellular glass insulation credit for withstanding extremely heavy floor loads, reducing vermin trouble to an absolute minimum and enabling them to maintain economically a constant 38° F. in the cooler and 8° F. in the freezers.

Throughout the meat-packing industry more and more plants are switching to this unique insulation, the only one composed of sealed glass cells which are waterproof, fireproof, rot-proof and vermin-proof. This remarkable combination of properties makes FOAMGLAS the ideal insulation for *your* plant, too.

For more facts on how to install and finish FOAMGLAS, write today.

Pittsburgh Corning Corporation

Dept. 0-35, One Gateway Center
Pittsburgh 22, Pennsylvania.
In Canada: 57 Bloor St. W., Toronto, Ontario

Owner Harry Moore indicates the grade line on the rear wall of his cooler. Bohrer & Moore was bothered with seepage of surface moisture into the adjacent freezer until it was insulated with FOAMGLAS. Engineer & Contractor was Russell Dresher, Wapakoneta, Ohio.

E. A. Hamann (left), Power Generation Engineer and Robert Best (right), Superintendent of Utilities, go over lubrication records with Bill Schall, Standard Oil lubrication specialist. Bill Schall has been providing technical sales service to Standard Oil customers since 1943. Bill is an engineer with a B.S. in engineering from Georgia Tech., and a graduate of Standard's Sales Engineering School. Customers of Bill's find this experience and background pay off for them.

Anheuser-Busch still using same turbine oil after 24 years

...NONPAREIL

For more than 24 years the Anheuser Busch Brewery, St. Louis, Mo., has been operating two 3,000 kw., turbines using NONPAREIL Turbine Oil. Three more turbines added to the system in 1940, '48 and '51 have also used NONPAREIL since beginning operations. The reason for choosing NONPAREIL is clear; it is guaranteed for the life of the turbine.

Since the initial installation, Anheuser Busch has not had to replace a NONPAREIL Turbine Oil fill. Neutralization number is always far below 0.15 mg. KOH/g., the degree of acidity Standard Oil guarantees NONPAREIL will not exceed. At nearly all times neutralization number is on the order of 0.03 mg. KOH/g. (See chart).

In all these years, oil systems have remained clean. There has been no problem of oil acidity in any of the five turbines. The delicate art of brewing world famous Budweiser goes on without concern over power failure due to lubrication failure.

Like to know more about NONPAREIL and its possible use in your turbines? In the midwest call your nearby Standard Oil lubrication specialist. Or, contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Anheuser-Busch Turbine Lubrication Record

Generator Capacity	Start up and NONPAREIL Installation Date	Date of Last Oil Analysis	Neutralization Number
3,000 kw.	Oct. 2, 1930	July 20, 1954	0.03
3,000 kw.	Oct. 2, 1930	July 22, 1954	0.02
2,500 kw.	June 10, 1940	July 20, 1954	0.03
7,500 kw.	Jan. 2, 1948	July 22, 1954	0.03
7,500 kw.	July 26, 1951	July 22, 1954	0.01

STANDARD

STANDARD OIL COMPANY
(Indiana)

KEEPING UP WITH THE FIELD

Technical News • Washington Highlights • Economic Trends • Labor Developments

"Rayed"-Pork Findings

Gamma ray treatment of pork has led to new discoveries, according to disclosures by Oregon State College scientists at the recent radiation sterilization conference in Chicago.

While the literature has indicated that freezing, dehydration, partial cooking, and packing in enert gas are good pre-irradiation steps helpful in preventing off-flavors, the OSC researchers reported that such methods had not improved their results.

In the OSC tests, high-intensity rays were directed on ground pork, and even trained tasters found no difference between cooked samples of the treated and untreated meat.

Milk Test 'Checks Farmer'

Laboratory pasteurized milk samples can now give fieldmen the "low-down" on cleanliness of producers' milking machines, says Dr. A. C. Fay, H. P. Hood & Sons, Boston.

The new test analyzes milk for presence of heat-resistant organisms.

Originally, this technique was designed for checking low bacteria counts, but now it's been found to correlate with cleanliness of equipment.

Strawberry for Freezing

A new strawberry — designated "2172"—has shown excellent, mild flavor and appearance for freezing in consumer-size packages, report researchers at Oregon State College. Plans call for its general production in 1956.

Not so promising are its possibilities for preserves, where initial experiments appear to indicate some process sensitivity. But further tests may determine greater suitability.

The new berry is resistant to red stele, which has crippled the lighter-colored Marshalls.

Sweet *and* Tart Juices?

Separate processing of sweet and tart canned orange juices may better answer taste preferences says USDA.

Polling of canned juice drinkers in Indianapolis shows people over 35 like tart juices, whereas those under 20 favor the sweet.

Seen are further possibilities of such taste-tailoring on other juices.

FDA Enforcements Seen Bolstered; But Getting Funds Is Still Problem

There's a good chance that, by July, FDA enforcement programs will be almost back to the 1951-52 level.

And such an increase represents a triumph for Bradshaw Mintener, former Pillsbury Mills general counsel, who now superintends FDA operations in his capacity as Assistant Health-Education-Welfare Secretary.

But such an accomplishment is not enough, he feels. His ultimate aim is to obtain non-partisan Congressional recognition of FDA as a consumers' FBI. The FBI, unlike the FDA, has been notably successful in getting the money it requests from Congress.

A money-getting knack would profit FDA. While this agency has some strong friends there, others, such as the now ranking minority member of the House Appropriations Committee, John Taber, have sought to cut down its appropriations. Still others have tried to inject these appropriations into partisan political battles.

As a result of the troubles FDA has had on capitol hill, its funds have been cut sharply during the past few years. Where, in the year ending in June 1952, the agency obligated some $5.3 million for enforcement programs, Congress's allotment ran only a little more than $4.8 million for the current fiscal year for such duties.

Both this reduction and such rising costs as Government pay scales have magnified the effect of this reduction. The number of field inspectors dropped from 249 to 194 as a result. It has since gone up slightly—to 206.

Last year these men were able to check some 10% of the 96,000 establishments which do a substantial interstate business in foods, drugs, and cosmetics. Too, their work has had to be directed primarily toward discovering violations that would endanger health, and, to a lesser extent, those involving filth. FDA has been able to do little about economic violations.

From within the industry, the agency has been receiving an increasing number of economic-cheating complaints—such as instances of product dilution or other skirting of the Standards of Identity. The sharp competitive practices which this generates, they say, won't uphold the current standards of processed-food quality.

Washington food industry observers are arguing over the degree of seriousness of this situation. But there is little hope that the $384,000 increase asked for FDA this year would allow much more than maintenance of the agency's status quo—certainly there can be no substantial boost in discovery and prosecution of economic violations.

However, a committee appointed by the H-E-W is now examining the organization and operation of the FDA, with a view to coming up with

(Turn page)

NCA's New Officers for '55

Named at recent Chicago meeting to lead National Canners Assn. is George B. Morrill, Jr., Burnham & Morrill Co., Portland, Me. (second from right). Others (l. to r.) are: William U. Hudson, Gerber Products Co., Oakland, Calif., new vice-president; Carlos Campbell, Washington, D. C., executive secretary; and E. E. Willkie, Pacific American Fisheries, Bellingham, Wash., retiring president, who becomes chairman of finance.

6-YEAR VIEW OF FDA'S INSPECTIONS AND OBLIGATIONS

Fiscal years	'51	'52	'53	'54	'55 Est.	'56 Est.*
Number of factory inspections . . .	13,357	13,172	12,502	10,119	10,800	(12,200)
Import lots inspected	39,942	32,481	31,971	25,105	23,150	(26,000)
Samples collected for examination . .	40,853	37,797	36,520	32,377	31,430	(36,500)
Lab analyses and other examinations	63,984	55,840	53,830	43,023	42,125	(47,800)
Total obligations ($1,000)	5,273	5,664	5,628	5,231	5,141	(5,542)
Obligations for enforcement ($1,000)	4,954	5,300	5,284	4,905	4,813	(5,215)

*Presidential budget requests.

recommendations by the time the Senate committee holds hearings on the budget requests, or by the time the full Senate and House discuss the matter. They could possibly then vote further requests.

Top FDA officials, however, feel that if they could count on similar future boosts in budget, this would be a much wiser way to increase their operations. The suggestion has been made, however, that a Presidential letter advocating stepped up activity by FDA might help. Those who feel such a move would be worthwhile think that Secretary Mintener, a pre-convention Eisenhower backer, might be just the man to accomplish it.

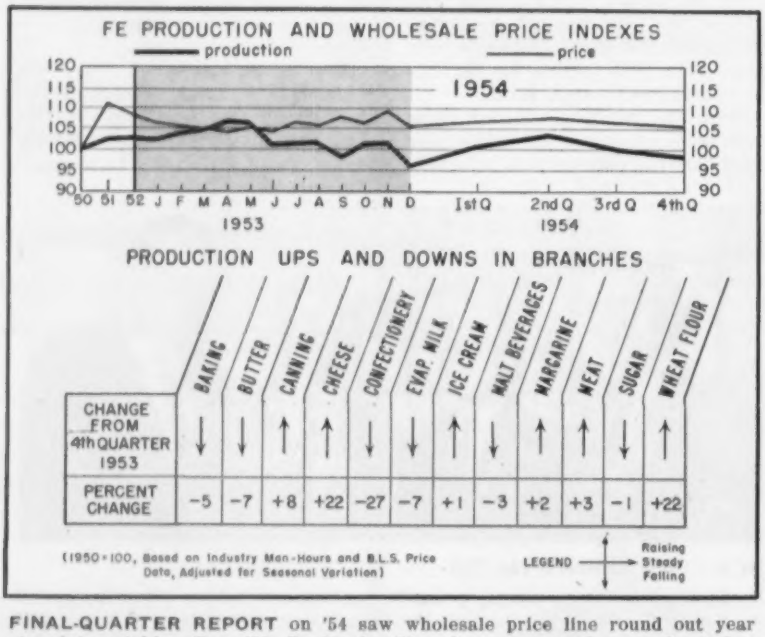
DDVP Challenges DDT

A powerful new insecticide designated DDVP—dimethyl (dichlorovinyl) phosphate—may replace the "old standby" DDT. The new product has been developed by the Savannah Laboratory of PHS's Communicable Disease Center in Atlanta.

Effectiveness against insects which have become immune to DDT may be its best selling point. In one experiment it demonstrated high potency when 8g. killed a large fly population in a dairy barn within 4 hr. An estimated 10,000g. of DDT otherwise would have been needed.

Another characteristic: High volatility stops its effectiveness after a short period. But this would make it suitable for use on crops.

Montrose Chemical Co. in New Jersey is experimenting with it for possible commercial production. Cost of manufacture is considered reasonable.



FINAL-QUARTER REPORT on '54 saw wholesale price line round out year at point matching Dec. '53. Production line, however, stood several notches higher than closing level of preceding year. Note that price line has now topped production line for more than a year and a half.

Study Package Chemicals For Hazard Possibilities

Because many chemicals used in packaging materials are relatively new to such uses, possibility of their contaminating foods and injuring health is being studied.

The nature of this problem and its technical complexities recently were discussed by Dr. Bernard L. Oser at the New York Section of the Institute of Food Technologists. Dr. Oser is director of Food Research Laboratories, Inc., Long Island City, N. Y.

So far as is known, however, no incidents have occurred to bring concern. To cite an actual case where a potentially injurious chemical was introduced into a food via the package, government officials have had to dig up the old practice of shipping tea in lead-foil containers.

So the problem is not one of imminent danger, but rather of conformity to federal laws aimed at keeping foods free from poisonous or deleterious substances.

No seizures based on adulteration with chemical components of packaging materials have ever been made. However, FDA is studying the matter, largely through voluntary cooperation of the chemical, packaging, and food industries. Scores of compounds have been sent in for informal checks.

More than 175 chemical ingredients of plastic food-packing materials have been listed, and roughly half of these are regarded as unsafe or unacceptable by reason of insufficient or no toxicological data.

Bread-Making Process Now Further Refined

Following introduction of American Dry Milk Institute's stable ferment process for simplifying bread making (FE June '54, p. 58), demand for a more concentrated ferment necessitated a formula revision.

Resulting concentrate gives the baker precise control over finished dough temperature, permits use of a constant volume of ferment regardless of flour absorption, and effects equipment economy by making at least twice as much bread.

New formula (based on 100 lb. of flour): Water, 32 lb.; yeast, 2-2½ lb.; sugar, 2-3½ lb.; salt, 1-1½ lb.; yeast food, 4-12 oz.; nonfat milk solids, 6 lb.; and enrichment tablets (optional in ferment or dough).

Experience shows that the ferment may require modification to meet particular plant conditions. Thus, ranges, rather than specific amounts of ingredients, are given.

Tests Will Gage the Safety Of A-Blasted Canned Food

How safe would canned foods be after an atomic bombing? What kind of storage would protect them? And at what distance from the blast?

Answers will be sought at the Nevada proving grounds during 1955 atomic tests. Some 25,000 samples of 60 different foods, provided by 153 canners, will be exposed at various distances from the blast under conditions simulating homes and shelters.

Post-explosion examination, including feeding tests, will determine any changes—both immediate effects and those after long storage.

Run in cooperation with the Federal Civil Defense Administration, the investigations are under direction of Dr. E. P. Laug of FDA. Joint planning has been conducted by NCA, the American Meat Institute, Can Manufacturers Institute, and Glass Container Manufacturers Institute.

Hors d'Oeuvres

▶ Russian scientists have produced canning-retort steam pressure with solar heat. Fine, so long as they don't come up with Sun bombs.

▶ Fishing has become so mechanically complicated as to discourage new recruits in England. So a college for fishermen is proposed. Fishermen go down to the sea on sheepskins?

▶ Collection of clippings by White Cap shows easier opening of food containers is big news. Nothing so frustrating as to have something good and not be able to get at it.

▶ Economic conditions really must be on the up in England. Price of tea has increased six times in a year.

▶ Opening a talk with a dramatic request for 11 sec. of silence, H. J. Heinz II then announced that another baby had been born, another customer for the industry. With apologies to Mr. Heinz, we point out that the newcomer immediately started to cry for food in convenient containers.

▶ You may have noticed the light brush given to processing in *Life's* special food issue. But why should *Life* tell the processors' story when they haven't told it themselves? City kids still think contented cows give canned milk.

▶ Direct electronic refrigeration we have yet. RCA passes electricity through bimetal junctions around a container and experimentally freezes 6 oz. of ice. Maybe we'll soon be able to quick-freeze turkeys by sticking a bunch of electric wires into their innards.

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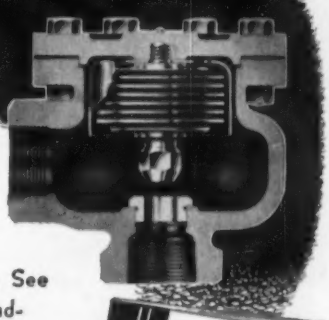

Send for Nicholson catalog 953. This 32-page standard reference on advance-type trapping of steam, air and other mediums contains: installation diagrams, charts for determining trap sizes, and advice on specific problems. See why leading plants are increasingly standardizing on Nicholson traps for increased production and minimum maintenance: thermostatic (illustrated) and metal expansion for pressures to 250 lbs.; weight and piston-operated, to 1500 lbs.

Send for Helpful Booklet

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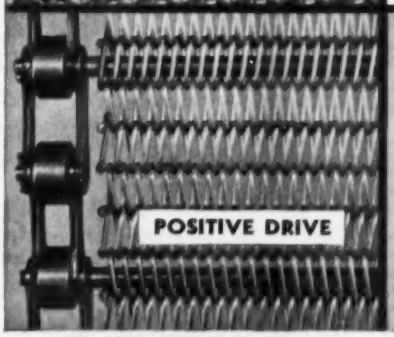
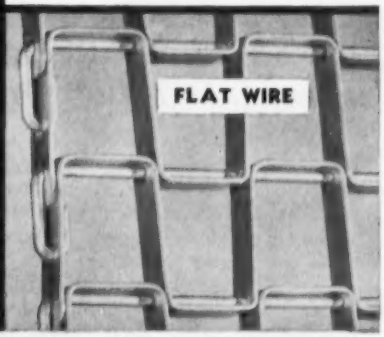
Process Belts

No matter what your product or process is, there's an Ashworth Belt design and wire size to help you carry it more efficiently and more economically.





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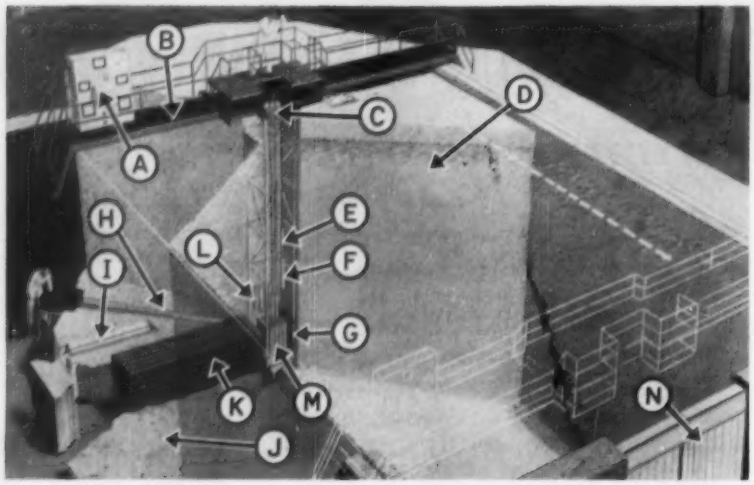


KEY POINTS of AMF reactor to be set up in New York area: (A) Control console, (B) bridge (movable, see phantom), (C) unitized control mechanisms, (D) water-shield "swimming pool," (E) control rod guide, (F) fuel assembly, (G) dry irradiation chamber cover, (H) beam hole, (I) through hole, (J) concrete shield, (K) thermal column, (L) ion tubes, (M) core, and (N) gate.

3 New Atomic Reactors Will Promote Research in Cold Sterilization

Further progress in cold sterilization and pasteurization of foods is now promised, following word that three new atomic reactors are in the planning stage in the Midwest and East.

Armour Research Foundation of Illinois Institute of Technology, Chicago, expects to have its new reactor in action by October. Seven companies are currently participating in this project, including Armour & Co.

Meanwhile, Battelle Memorial Institute has awarded a contract for construction of a nuclear reactor near Columbus, Ohio. Aimed to be in operation early in 1956, this facility will supplement the Institute's present fission-byproduct installation with which investigations have been proceeding with a 2,000-curie source (cobalt-60).

And further planned is a new unit (above) in the New York City area. This one, to be sponsored and built by American Machine & Foundry Co., which is also contractor of the new Battelle facility, will be jointly owned and operated by private industry. Participation has been invited among leading concerns, including those in the food field.

The Columbus and New York equipment will be of the "swimming pool" design, already proved in earlier experimentation and termed suitable for a wide variety of applications. Here, replaceable, unitized control units will curb obsolescence factors, thus promoting continued progress.

Chemical Group Okays Ingredient Pre-Testing But Opposes an FDA "Licensing" Function

Favor for mandatory pre-testing of new food ingredients has now been expressed by the chemical industry. But change of the FDA function from "policing" to "licensing" is opposed from this quarter.

The statement was delivered by William C. Foster, president, Manufacturing Chemists' Assn., speaking before the Food, Drug & Cosmetic Law Section, N. Y. State Bar Assn.

"The chemical industry," he said, "does not believe that FDA, or any other administrative body, should be required to give a final 'Yes' or 'No' regarding use of a food ingredient."

This prior-approval concept—termed by Mr. Foster as being, in effect, licensing—was pictured as finally depending upon the judgment of a single official who would assume responsibility for the safety of every new food product.

According to Mr. Foster, this might well lead to extreme conservatism, and as an almost certain result, food research would be curtailed. He said that under licensing no manufacturer could be sure that his risk-investment in research could pay off because of uncertainty regarding decisions by one official. Suggested were five specific amendments, considered by the chemical industry as making for new strength of the Act:

1. Add a provision to the Act that no new ingredient intended for food use, nor food containing such new ingredient, should be shipped in interstate commerce or used in foods unless the shipper or user submits his full data on safety to FDA well in advance of the date proposed for use.

2. Add a provision that FDA have a reasonable time in which to review this data.

3. Amend the law to provide that it is a violation to ship such an ingredient (or food containing it) which is unsafe in the manner used or intended to be used, or which has been inadequately tested for safety for such food use.

4. In order to resolve initial differences between FDA and the supplier or user, add a provision for informal conferences.

5. Where such initial differences can't be resolved, provide that FDA have recourse to Federal Courts.

Surplus Butter Problem May Be Solved by Ghee

USDA is experimenting with the idea of disposing abroad of its huge butter surpluses by converting butter into ghee—a substance that is about 99% butter fat. It is obtained by removing the moisture from butter—for which there is a large potential market in the Middle East and South Asia.

Nine U.S. dairy companies, including Carnation and Land O'Lakes, are cooperating in the effort to find a way to make an acceptable ghee economically.

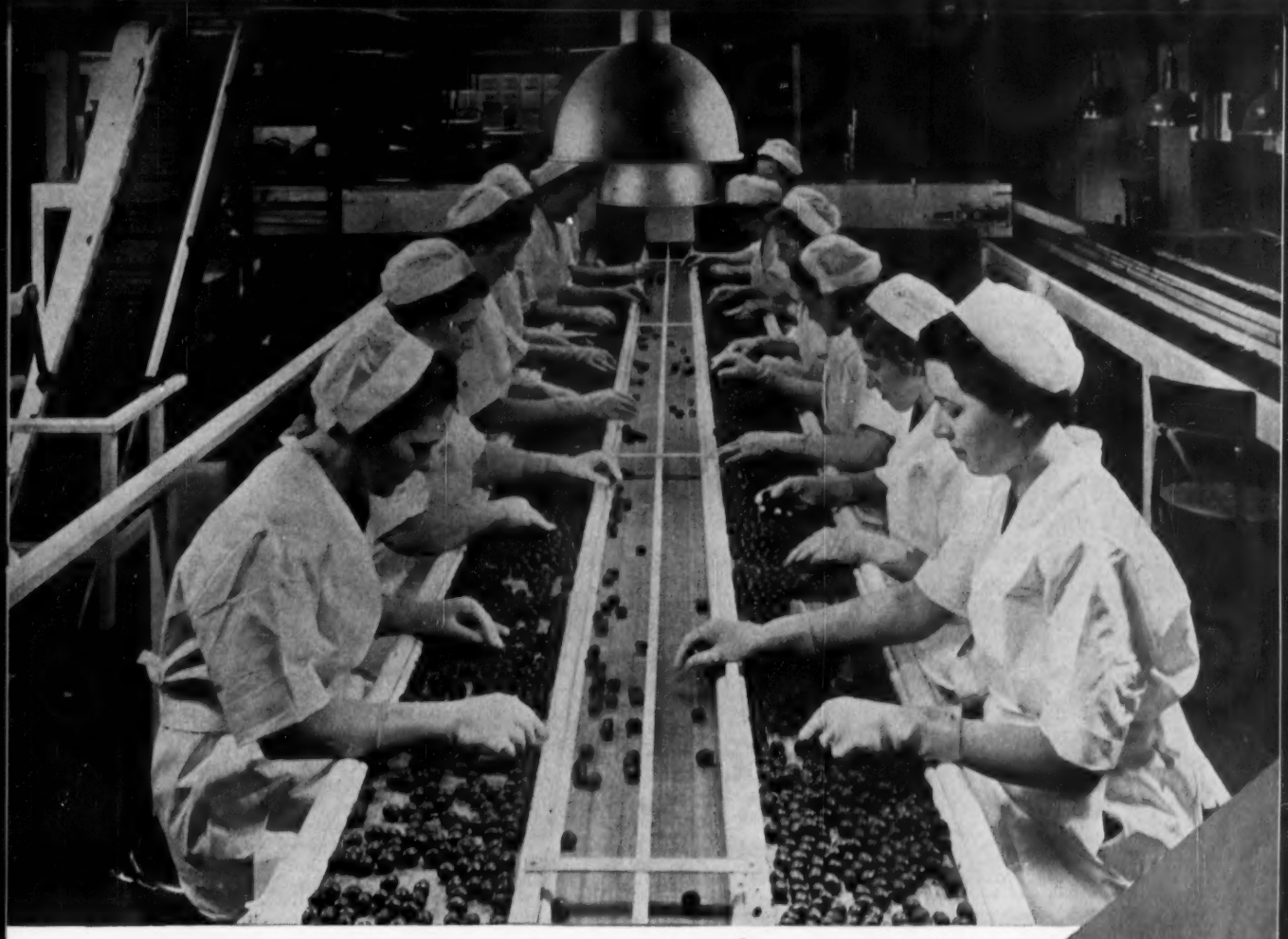
Two big obstacles stand in the way, however: First price. Butter stocks cost CCC approximately 64c. per lb. Add to this 5c. for conversion, plus 20% shrinkage, and the cost becomes 86c., whereas top retail price of good Indian ghee is 58c. a lb.

Second problem is to convert butter to a product that resembles ghee. It is light in color, granular in consistency, and tastes (to Westerners) quite rancid. It differs from butter oil in color, texture, and flavor.

Still, USDA and dairymen believe satisfactory methods will be developed for producing an American ghee acceptable to foreign buyers.

Bacterial-Spot Spray

Agri-mycin, a combination of terramycin and streptomycin, has proved effective in control of bacterial spot in tests at Florida State Agricultural Experiment Station, Belle Glade.



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Thermoid Conveyor Belting cuts handling costs on food processing jobs

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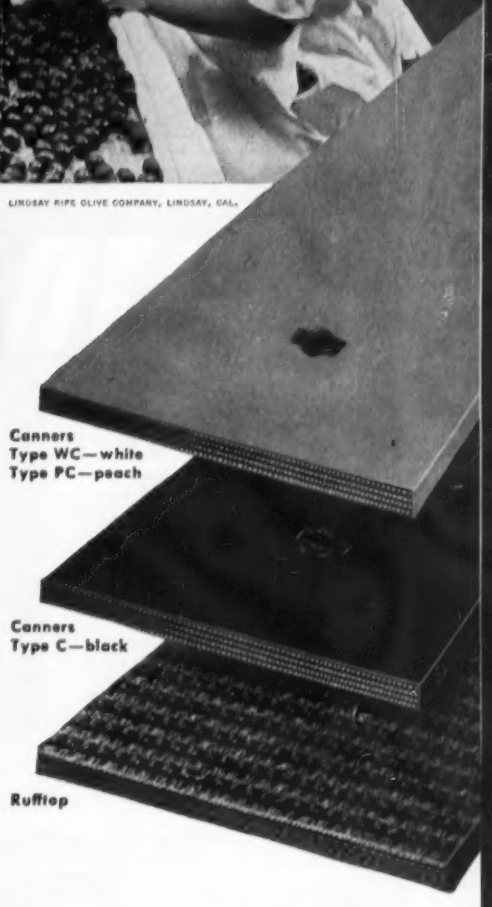
Thermoid's exclusive impregnation process welds carcass and cover into an exceptionally strong, durable belt. Finest quality reinforcement and specially compounded rubber stocks assure long life, less down time, lower handling costs. Your Thermoid Distributor can help you select the Conveyor Belt best suited for your requirements. If you prefer, write direct for Catalog 3679.



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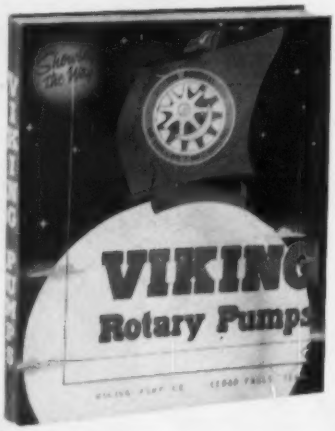

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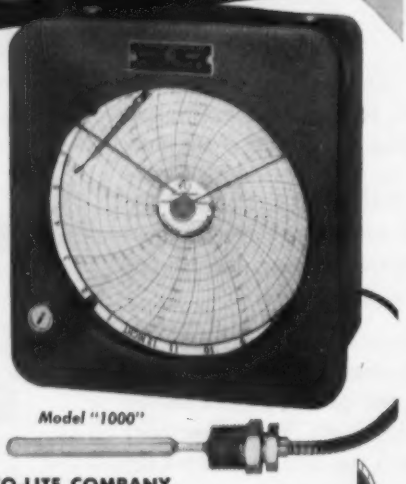

Model "1000"

THE ELECTRIC AUTO-LITE COMPANY
INSTRUMENT AND GAUGE DIVISION
TOLEDO 1, OHIO
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TEMPERATURE RECORDERS

Briefly . . .

● TWO MOBILE LABS are slated to tour Pepsi-Cola bottling plants in Canada and Mexico to assist in maintaining product-quality standards. Each truck-and-trailer unit will be manned by a chemist and technician.

● **COMBAT-RATION storage life will be boosted from the present 3 yr. to 5 yr. by the Army's plan for holding reserve supplies under refrigeration at 33 deg. F. with controlled humidity.**

● WINE PRODUCTION in California hit 118,807,000 gal. last year, up more than 8% over '54.

● **AN ELECTRON MICROSCOPE has been given by General Foods Corp. to Rutgers University. The $15,000 instrument will be used by various departments at the university, including Food Technology.**

● POTATOES may come to market labelled for specific use as a result of experiments by USDA scientists. Put in a brine solution, some of the tubers float, some sink. And the latter prove best for baking, boiling, or chipping.

● SCHOOLS OF FISH are now being **revealed in enlarged, five-fathom-section views on the electronic spotting screens aboard fishing trawlers. The handy magnification is achieved with a new attachment (Bendix) just put on the market.**

● MEAT PACKING courses have now been taken by a total of more than 11,600 employees in the field through home-study services offered by the Institute of Meat Packing, U. of Chicago. A nominal fee covers text book, lesson material, and cost of grading and returning lessons. The eight categories of the curricula are detailed in a newly revised brochure.

Regional Bakers' Dates

Scheduled for April are the following annual conventions of regional bakers' associations:

Southern Bakers, Vinoy Park Hotel, St. Petersburg, Fla. (14-16); Rocky Mountain Bakers, Albany Hotel, Denver (17-18); Pacific Northwest Bakers, Multnomah Hotel, Portland, Ore. (18-20); and Southwest Bakers, Cortez Hotel, El Paso, Tex. (30-May 2).

USDA & FDA Standards

Recent Grade and Identity Standard actions by the Agricultural Marketing Service and FDA include the following (references are to *Federal Register*):

Enriched farina, change in vitamin content proposed via amendment to FDA Identity Standard, *F. R.* Jan. 26, p. 565.

Asparagus, canned, proposed fourth

"Another Product Safely Shipped in Inland 'protection-eered'* Containers"

SPECIAL LINING ON INLAND CONTAINERS PROVIDES CORN PRODUCTS REFINING COMPANY WITH EXTRA CHECK ON QUALITY

When corn syrup leaves Corn Products Refining Company's plant at Argo, Illinois, bound for thousands of food and industrial uses, it is as pure and uniform as the most scientific processing and exacting quality control measures can make it. Besides the many laboratory tests, mechanical and visual inspection is made wherever possible, including the final filling operation where the crystal clear liquid is poured into steel shipping containers.

To aid Corn Products Refining Company in this final, all-important inspection, Inland provides a special aluminum sanitary lining on the containers they supply. As the container is being filled, any discoloration or sedimentation can be quickly and easily detected, assuring Corn Products Refining Company that every shipment of their syrup is given the "all clear" signal before it leaves the plant.

Maybe an Inland Steel "protection-eered" container can help with your quality control problems. Why not talk to your Inland representative and see?

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pack corn today

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ship tomorrow

PURITY NCS for cream style corn reduces weeping or separating during long shelf life. The consistency changes very little even after six months' storage.

PURITY NCS cooks at a higher temperature than regular corn starch. It gelatinizes only partially in the kettle. Complete cooking takes place on retorting with little breakdown. It offers unusual resistance to retrogradation when stored at normal temperatures.

All of which means that the corn you pack today may be shipped tomorrow . . . *at considerable rehandling and inventory savings to you!*

PURITY NCS is also ideal for soups, sauces and gravies.

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- ☐ **CLEARJEL** for canned fruit pie fillings
- ☐ **FLOTEX** for processing at lower temperatures
- ☐ **PURITY SDW** for processing at extremely high temperatures

revision of Grade Standard by AMS., *F. R.* Jan. 29, p. 651.

Shell eggs, revised AMS Standard, *F. R.* Feb. 1, p. 667, minor corrections, *F. R.* Feb. 4, p. 757.

Egg products, proposed revision of AMS rules for grading and inspection, *F. R.* Feb. 12, p. 911.

Peas and carrots, frozen, revised AMS, Grade Standards, *F. R.* Feb. 17, p. 1010.

Commodity Developments

Following recent actions concerned butter, eggs, limes, tomatoes, peaches, corn, and rice:

Butter. USDA has sold 105,456 lb. of the 10,000,000 lb. of CCC butter offered for export sale on competitive-bid basis. Bids, which are being considered each Monday (having begun Jan. 24) must be for Grade A or B U. S. butter. Interested parties should contact Livestock & Dairy Div.

Eggs. Proposed are changes that would slightly modify re- (*turn page*)

Schedule of Events

March

13–16—National Assn. of Frozen Food Packers, National Wholesale Frozen Food Distributors Assn., annual convention and exposition; Conrad Hilton Hotel, Chicago.

17–19—Pacific Dairy & Poultry Assn., annual meeting; Hotel Utah, Salt Lake City.

20–23—National Sanitary Supply Assn., annual convention & exposition, Convention Hall, Atlantic City, N. J.

28–30—American Management Assn., manufacturing conference; Palmer House, Chicago.

29–30—National Conference of Interstate Milk Shipments; Hotel Peabody, Memphis, Tenn.

April

3– 6—Peanut & Nut Salters Assn.; Hotel Shoreham, Wash., D. C.

5—Eastern Frosted Foods Assn.; Belmont-Plaza Hotel, New York City.

12—Refrigeration Research Foundation, annual meeting; Edgewater Beach Hotel, Chicago.

17–20—American Oil Chemists' Society, annual meeting; Roosevelt Hotel, New Orleans.

18–21—American Management Assn., National Packaging Exposition (International Amphitheater) & Conference; Palmer House, Chicago.

18–24—International Food Show; Kingsbridge Armory, New York City.

19–20—American Dry Milk Institute, annual meeting; Edgewater Beach Hotel, Chicago.

23–27—National Independent Meat Packers Assn., annual meeting & exhibit; Palmer House, Chicago.

24–25—National Pretzel Bakers Institute, spring convention; Bedford Springs Hotel, Bedford Springs, Pa.

24–27—National Fisheries Institute, annual convention; Roosevelt Hotel, New Orleans.

28–29—Pennsylvania Manufacturing Confectioners' Assn., annual production conference; Franklin & Marshall College, Lancaster.

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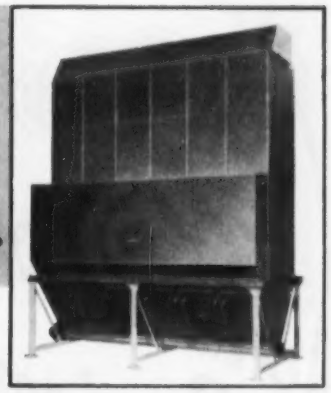
Simplified Modern Design



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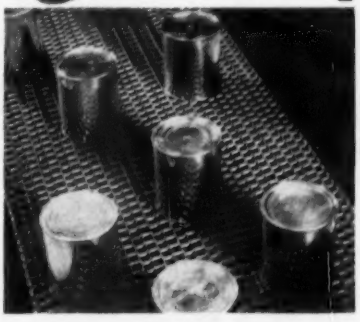

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BELOIT, WISCONSIN

quirements for preparation of frozen egg mixes and blends which have salt, sugar, and other stabilizing ingredients added. To the inspection mark would be added the letters "USDA" (in uppermost portion of shield design of official identification). This would help prevent unauthorized use of the official inspectoin mark.

It is further proposed to bring the regulations, minimum sanitary requirements, and processing instructions together in a single publication, resulting in a reorganization of the format similar to that contained in the regulations for shell egg and poultry grading and inspection.

Limes. A proposed marketing agreement and order program for Florida limes was under discussion at press time. It would regulate size grade, maturity, and quality of lime shipments grown in Florida.

In addition, it would check on size, capacity, weight, dimensions, and pack of containers, and for establishment, improvement, assistance, and promotion of research projects and consumption, marketing, and distribution of limes.

Tomatoes grown in Florida also are subject of a proposed marketing agreement and order. The area would include all growers in the state east or south of the Suwannee River. Production would be governed by a committee of 15 growers, selected on the basis of five districts. The committee would recommend grade and size regulations.

Peaches. Georgia peach growers have voted to continue their marketing agreement and order by 70% of the total producers voting. The order governs peaches shipped interstate.

Corn. USDA's 1955 corn crop allotment covers 49,842,697 acres in 805 counties of 21 commercial corn producing states, comparing with 46,995,504 acres in 834 counties of 22 states in '54.

Rice. Growers of rice approved their marketing quotas for '55 by 90% of all votes cast. This automatically puts the rice marketing program into effect, thus chalking up against farmers who exceed their quotas a penalty equal to 50% of the June 15 parity price on excess rice. Acreage has been set at 1,859,099 for 1955, 24.7% less than in 1954.

USDA will donate up to 140,000 cwt. bags of rice to domestic school lunch programs and welfare use. The CCC-owned rice will be remilled to U.S. No. 2 Grade, or exchanged for that grade for the program. CCC will pay costs of Transportation to central points within the states.

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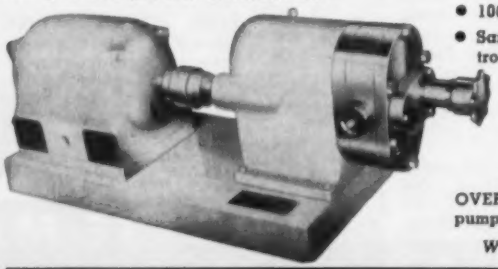

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OVER 40 YEARS of making BETTER pumps. Dealers everywhere.

Write for detailed information

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Remote Heating

—*Continued from page 62*

tering the fryer is controlled by a three-way mixing valve that varies the relative volumes of oil passing through the heat exchanger and through a bypass around the exchanger. Or the valve may be placed in the heating-liquid line.

The temperature sensing element that operates this valve is located near the inlet end of the kettle.

To maintain a predetermined difference between the temperature of the oil entering the kettle and that of the oil leaving the kettle, a bypass around the kettle is provided with a three-way diversion valve.

An example of the effect of the bypass around the kettle is as follows: Assume that under full load conditions, production is 800 lb. of finished chips per hour from potatoes having 18% solids and 38% oil content. Since 325,000 Btu. is needed to cook 100 lb. of chips, the total heat load is 2,600,000 Btu. per hour. Now, the specific heat of cottonseed oil at 350 deg. F. is 0.57 Btu. per lb., and the specific gravity is 0.81. Therefore, 3.85 Btu. will raise 1 gal. of cottonseed oil 1 deg. F.

Assume temperature conditions of oil entering the kettle at 360 deg. and the exit temperature of 320 deg. Then 1 gal. of oil gives up 154 Btu. (3.85 Btu. per deg. x 40 deg. temperature change). And the total heat load of 2,600,000 Btu. per hour divided by 154 shows that 16,883 gal. of oil must be circulated through the kettle per hour, or 281 gal. per minute.

If the load was decreased to 600 lb. of chips per hour, the volume of oil circulated through the kettle would immediately drop to 211 gpm. Therefore, 70 gpm should be bypassed.

Vapor-Lock Problem

One of the problems that had to be licked in pumping the hot oil is vapor lock. Here is the theory behind this phenomenon. Fine water droplets, driven out of the frying potato slices, are carried in the oil more or less as an emulsion. In the heat exchanger, the higher temperature releases some of this water as vapor. Then more is freed by the action of the pump impeller when the hotter oil from the kettle bypass reaches the pump. The vapor thus freed causes vapor lock in unless the pump is designed to handle a certain percentage of gas as well as liquid. The Lay installation uses a LaBour non-priming centrifugal pump.

Amount of vapor released in the oil can be reduced by eliminating the kettle bypass and controlling the amount of oil that flows through the kettle in another way. To be used in Lay's new Jacksonville plant, this method involves passing all of the oil through the kettle and controlling flow by a back-pressure valve. This valve is regulated from a temperature controller with its sensing element at the discharge end of the kettle. As back-pressure increases on a centrifugal pump, the volume of fluid passing through it decreases.

This reduces the vapor lock problem, because no "hot" oil is bypassed directly into the pump suction. All of the oil now flows through the kettle. But there still is an emulsion of water droplets in the oil. And the pump must be able to handle water vapor without becoming vapor locked.

Oil Cooled for Shutdown

No heat is stored in the cooker other than the sensible heat in the cooking oil, plus a small amount of heat in the kettle itself. So at the end of an operation, the oil in the system can be easily and quickly cooled by means of a water-jacketed section of pipe in the oil line. By continuing the operation of the oil-circulating pump and admitting water into the jacket of the heat dissipator, the entire mass of oil can be quickly cooled down to temperatures at which it will not deteriorate rapidly.

End (Resume reading on page 63)

Setting Pay Rates

—*Continued from page 59*

10. Punctuality—being on time, or ahead of time for work, appointments, etc.

Even though Personal Factors have never been used as a means of merit rating, nevertheless through the years the system has been in use, an almost exact correlation has been found between merit rating derived from Work-Quality Factors and Job Factors and the individual's score on Personal Factors.

Since this relationship has "registered" with the craft employees, it has helped to improve the general level of worker conduct in the engineering department.

Of course, merit rating costs time to accomplish successfully. Throughout the year, the department foreman or supervisor must give constant consideration to the relative merits of each worker in his department. The system requires this if the department head is to come up with fair relative ratings at the end of the year.

Even in companies without the system, however, department heads who are "on the job" will observe their workers' progress and attitudes.

Admittedly, the once-a-year filling out of the merit rating forms is time-consuming. And the interviews themselves average approximately 20 min.

This may seem exhorbitant—so much time away from the job, sometimes encroaching on production, just to obtain merit ratings. However, the values are greater than the cost.

Very seldom is there any difference of opinion between department head and union representative regarding the rating of a worker. Also, it is seldom that a worker finds just cause for objection to the scoring of any item on the merit ratings sheet or the final relative score.

A numerical figure for a specific factor may seem too low to a worker. Yet the figure may then be supported as fair and reasonable when compared to the rating of a fellow worker who is admittedly more competent, if only by a slight degree.

In truth, it has been found that hourly rates related to the workers' merit rated values in the company are satisfactorily fair to each individual.

Rate Graph and Results

When all workers in a department have been checked, the three highest ratings are jotted down and averaged —giving the score for the top rate of pay. Then a graph sheet is prepared and a straight line drawn on it connecting the minimum department rate of pay and the maximum rate—that is, the average of the three top workers.

It is then a simple matter to translate from the graph any merit rating in that department to a correspondingly fair hourly rate of pay.

Unquestionably, the merit rating system has improved worker morale at this leading food plant. Moreover, it has made for better union-management relations in the engineering department.

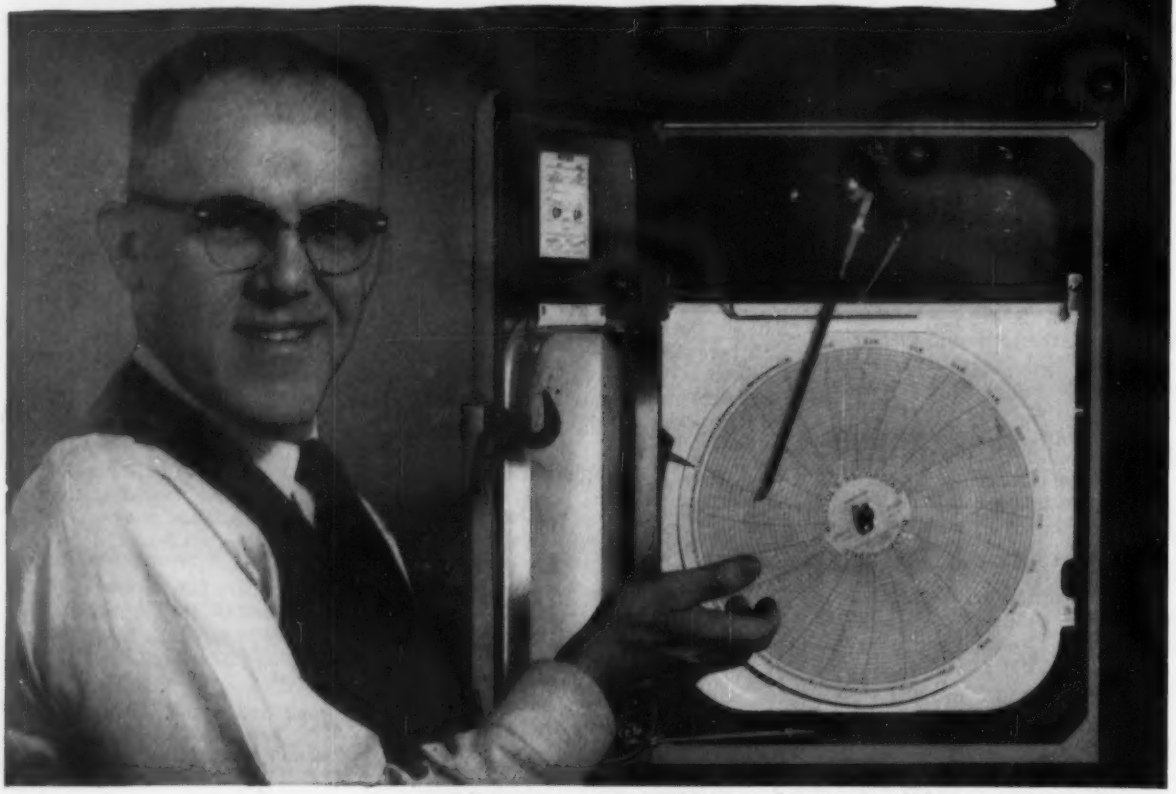
Evidence is provided in a number of ways, among them the fact that both turnover and absenteeism have been reduced.

Since this system has become established at this plant there has always been a waiting list of applicants for jobs in the engineering department.

Meanwhile, production employees of the company have expressed a desire for a similar merit-rating system in their departments. In fact, many of those on the engineering department's application list have been workers wishing to be transferred from production departments.

End (Resume reading on page 60)

WHAT'S NEW AT BRISTOL . . . . WHAT'S NEW AT BRISTOL



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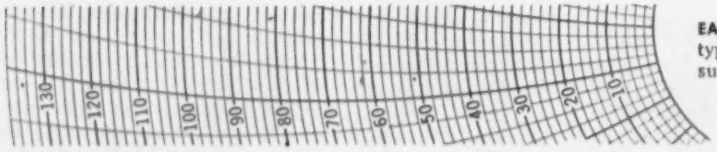
Another Bristol first — Dual-filled Vapor Pressure Thermometer with uniform linear scale

• These new instruments are the latest example of Bristol's continuing leadership in the field of industrial thermometry. They represent the first really important advance in filled-system thermometer design in more than 25 years. With this new development, all the valuable features of the vapor pressure system are retained. In addition to the linear scale, the elimination of ambient temperature effects makes new standards of accuracy possible.

Get the complete story on these rugged, precision instruments. Write for free 48-page bulletin T840. It will tell you all about typical installations, ranges, charts, bulbs and tubing. The Bristol Company, 115 Bristol Road, Waterbury 20, Conn.



EASY-TO-READ. This full-size section of a typical Bristol Dual-filled Vapor Pressure Thermometer chart shows the extreme clarity and definition of its uniform linear scale.

4.12

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PRODUCTS

Foodstuff Containing Hydrolyzed Chitin as Growth-Promoting Substance—*P. Gyorgy, Villanova, Pa., R. Kuhn and F. Zilliken, Heidelberg, Germany to American Home Products Corp., New York City. No. 2,694,640. Nov. 16, 1954.*

Storage-Stable Fermentation Composition Comprising ¼-1 g. Zymase per oz. Sugar—*H. G. Atwood and J. F. Marshall, Los Angeles. No. 2,694,641. Nov. 16, 1954.*

Enriched Alimentary Paste Consisting of Farinaceous Material Plus Minor Proportion of Thiamin Naphthalene 1:5-Disufonate—*K. Westphal, H. Andersag, and G. Widmann, Wuppertal-Elberfeld, Germany to Schenley Industries, New York City. No. 2,694,642. Nov. 16, 1954.*

Fat Particles Encased in Cold-Water Soluble Sugar-Gelatin Mixture—*F. E. Robinson and W. F. Bronson, Chicago to Wilson & Co. No. 2,694,643. Nov. 16, 1954.*

Marzipan Roses From Sugar-Almond Paste Mixture by Spreading Scalloped Convolutions of Severed Coil of Cake Decorating Paste—*F. L. Knab, Sr., Palos Park to A. and F. Knab, Jr., Chicago. No. 2,694,644. Nov. 16, 1954.*

Antioxidant Comprising Alkylated Flavone With Hydroxyl Substituent—*W. K. T. Gleim, Orland Park to Universal Oil Products Co., Chicago. No. 2,694,645. Nov. 16, 1954.*

Synergistic Microbicidal Composition Having N-Dodecylbenzyl-N,N,N-Trimethyl Quaternary Ammonium Chloride, Minor Proportion of Dodecyl Benezene—*R. D. Stayner, Albany to California Research Corp., San Francisco. No. 2,694,663. Nov. 16, 1954.*

Raw Dextran by Buffered Fermentation—*G. S. Stoycos to Commonwealth Engineering Co., Dayton, Ohio. No. 2,694,670. Nov. 16, 1954.*

Ice Cream Confection With Farinaceous Cone Having Plurality of Horizontal, Closely Spaced Projections to Limit Vertical Splitting—*A. F. Hoff, Baltimore, Md. No. 2,695,237. Nov. 23, 1954.*

Antifoam Comprising Substituted Di-Glycerol Ethers Plus Polyglycol Ether Non-Ionic Emulsifiers—*G. Jaccard and K. Stockar to Sandoz Ltd., Basel, Switzerland. No. 2,695,892. Nov. 30, 1954.*

Alpha Amylase by Cultivating *Bacillus Stearothermophilus* on Nutrient Medium of Starch Plus Proteinaceous Material — *P. A. Tetrault and E. Stark to Purdue Research Foundation, Lafayette, Ind. No. 2,695,863. Nov. 30, 1954.*

PROCESSES

Growing Mushroom Mycelium by Inoculating Sterile Nutrient Medium With Mushroom Tissue, Forcing Air Beneath Culture Surface, Agitating—*H. Humfeld, Berkeley, Calif. to U.S.A. No. 2,693,665. Nov. 9. 1954.*

Destringing Meat Products by Passing Links Through Oscillating Throat Member to Remove Tie-Strings—*E. G. Anderson and O. M. Toennies to E. Kahn's Sons Co., Cincinnati, Ohio. No. 2,694,217. Nov. 16, 1954.*

Separating Milk Into Butterfat Fraction and Water Suspension of Butterfat, Residual Solids in Dual Centrifugal—*V. O. Goument, Berwick-on-Tweed, England. No. 2,694,520. Nov. 16, 1954.*

Whipping Cream by Reciprocating Plurality of Partially-Filled Containers While Simultaneously Injecting Gas at Predetermined Pressure—*F. F. Suellentrop to Lemay Machine Co., Lemay, Mo. No. 2,695,123. Nov. 23, 1954.*

Purifying, Isolating Proteins From Non-Proteinaceous Matter in Aqueous Solution—*I. A. Parfentjev, New Haven, Conn. No. 2,694,666. Nov. 16, 1954.*

Treating Whey to Simulate Foaming and Heat Coagulating Properties of Egg White by Cooling, Partially Precipitating Lactose, Adjusting pH to 11-12, Acidifying to pH 9-10.5, Separating Precipitated Solids—*B. de Goede to Nederlandse Centrale Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek, The Hague, Netherlands. No. 2,695,235. Nov. 23, 1954.*

Making and Dispensing Effervescent Liquids—*R. B. Barton, Chicago. No. 2,695,236. Nov. 23, 1954.*

EQUIPMENT

Homogenizer Having Expansion Nozzle, Plurality of Stationary Plates, Coaxial Apertures, Conduit Means—*K. E. Gressly, Konolfingen to Alpura A. G., Bern, Switzerland. No. 2,690,329. Sept. 28, 1954.*

Pipe Line Cleaning System Comprising Portable Closed Tanks, Air Supply Line, Control and Check Valves for Direct, Reverse Flow—*Z. O. St. Palley, Branford and L. I. Rivard, New Haven, Conn. No 2,690,756. Oct. 5, 1954.*

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Adjustable for the following case size range:
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Egg Washer Comprising Tank, Oppositely Rotating Brushes Forming Receiving Trough, Screw Conveyor Feeding Means—*J. Dreesman, Algona, Iowa. No. 2,690,576. Oct. 5, 1954.*

Poultry Tendon-Extractor With Base, Leg-Engaging Portion, Upright Receiving Slots, Rotable Furcate Member, Handle—*H. A. Hillsen, Sr., Sunland, Calif. No. 2,690,588. Oct. 5, 1954.*

Feeding and Proportioning Conveyor for Carrying Predetermined Weight of Material Evenly Spread—*W. R. Peterson, Hinsdale and A. C. Radtke, Oak Park, Ill. to International Harvester Co. No. 2,690,833. Oct. 5, 1954.*

Egg Separator With Endless Conveyor, Cupped Trays Which Oscillate Between Liquid Retaining, Discharging Positions, Washing Means—*J. C. Gill, Indianapolis, Ind. No. 2,690,837. Oct. 5, 1954.*

Butter Print Mold Having Ram Reciprocable in Vertical Slot, Aperture to Receive Charge—*H. R. Coon, Sr. and E. J. Rapp, Toledo, Ohio to Lynch Corp. No. 2,691,218. Oct. 12, 1954.*

Dough Working Machine Comprising Compressing Rolls, Rotating Cylinder, Downwardly Sloping Plate, Endless Conveyor.—*E. A. Turner, Hartsdale, N.Y. to The Standard Stoker Co. No. 2,691,351. Oct. 12, 1954.*

Pusher Plate Having Roller Bearing for Slicing Machine—*C. Klingens to U. S. Slicing Machine Co., Inc., La Porte, Ind. No. 2,691,397. Oct. 12, 1954.*

Gage Plate Adjusting Mechanism for Slicing Machine—*C. Klingens to U. S. Slicing Machine Co., Inc., La Porte, Ind. No. 2,691,398. Oct. 12, 1954.*

Prefabricated Baking Oven Wall Having Insulation Between Polygonal Sheet-Metal Plates, Aligned Flanges, Tie Rods—*C. Klein, Warrenville, R. C. Skarin, Western Springs, and W. C. Tinker, Itasca, Ill. to The Petersen Oven Co., Franklin Park, Ill. No. 2,691,432. Oct. 12, 1954.*

Filter Leaf Comprising Hollow Vertical Tubular Support Member, Radial Corrugated and Fine Mesh Sheet, Opposed Longitudinal Slots, Outlet Duct—*H. Eickemeyer, Wiesbaden, Germany to A. Langnickel, Cedar Grove, N.J. No. 2,691,445. Oct. 12, 1954.*

Distributor for Granular Material Having Hopper, Outlet to Inner Circular Chamber, Rotatably Mounted Brush—*M. W. Guyer to Calkins Mfg. Co., Spokane, Wash. No. 2,691,468. Oct. 12, 1954.*

Load Supporting Pallet With Upper, Lower Plates, Intermediate Cylindrical Support Elements Contained in Open-Ended Boxes—*R. E. Watts to Fleming & Sons, Inc., Dallas, Tex. No. 2,691,499. Oct. 12, 1954.*

Corrugated Paperboard Pallet Comprising Platform, Spaced Parallel Slots, Plurality of Rectangular Hollow Legs, Locking Strips—*M. M. Baumann, Glencoe, Ill. to International Paper Co., New York City. No. 2,691,500. Oct. 12, 1954.*

Egg Washer Comprising Tank, Conveying Ramp with Pliable Sheet-Form Sides, Movable Brush, Egg Retarding Means—*W. J. Reading, Ottumwa, Iowa. No. 2,691,786. Oct. 19, 1954.*

Cheese Press Including Heated, Double-Walled Receptacle, Plurality of Upwardly Opening Molds, Inflatable Cushion, Stationary Abutment for Simultaneously Pressing Curd, Ejecting Whey—*K. Zeiler and K. Lenz to Anton Steinecker Maschinenfabrik A. G., Freising, Germany. No. 2,691,935. Oct. 19, 1954.*

Combination Food Grinding, Grating, Pulverizing, Slicing, Weighing Machine—*C. Matarrese, New York City. No. 2,691,997. Oct. 19, 1954.*

Portable Material-Elevating Conveyor Having L-Shaped Frames, Wheels, Elongated Endless Belt, Guide Means—*M. E. Deverall, Salt Lake City, Utah. No. 2,692,040. October 19, 1954.*

Want more information on any of these recent patents? If so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers of those you want and enclosing 25¢ for each copy.

Olive Packer With Plurality of Loading Stations, Reciprocating Members Mounted to Successively Fill Containers, Feed, Control Means—*T. C. Kelly, Hinsdale, Ill. No. 2,692,073. Oct. 19, 1954.*

Dough Kneader Having Hopper, Recirculating Trough With Plurality of Mixing Worms—*F. C. Mendoza, Mexico City. No. 2,692,124. Oct. 19, 1954.*

Scrapple Stirrer Including Tank, Vertical Spindle, Pivotally Mounted Scraper, Rotating Means—*C. A. Light, Palmyra, Pa. No. 2,692,125. Oct. 19, 1954.*

PACKAGING

Carton Sealer Comprising Adhesive Reservoir, Plurality of Gravity-Fed Hollow Applicators, Flap Closing Means—*P. G. Schlemmer, Nanuet, N.Y. No. 2,691,260. Oct. 12, 1954.*

Unitary Closure Cap and Pouring Spout for Container—*A. P. Cesta, to Produtos Quimicos Guarani S/A., Sao Paulo, Brazil. No. 2,692,709. Oct. 26, 1954.*

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APPLE PECTINS
Standard of Quality for 30 years

BETTER JAMS
Jellies and Confections Because...

1 Wide pH Range
2 Uniform Strength
3 Neutral in color and flavor—blends naturally with more different fruits than any other pectin
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Unitary Portable Bag Conveying and Stapling Machine Comprising Frame, Endless Belt, Plurality of Loading Stations, Guiding, Closing Means—*L. A. Casper, Clarksburg, N. J. No. 2,691,777. Oct. 19, 1954.*

Thermoplastic Labeler With Supply Station, Transfer Mechanism, Reciprocating Suction Head, Timed, Heated Rotating Member—*P. A. Ketchpel, to Ketchpel Engineering Co., West Englewood, N. J. No. 2,692,063. Oct. 19, 1954.*

Apparatus for Evacuating and Heat-Sealing Flexible Packages Comprising Clamping Members With Channels for Vacuum Connection—*W. G. Mueller, F. H. Cherepow, A. Barts, Jr., Neenah, and K. Klause, Appleton to Marathon Corp., Menasha, Wis. No. 2,692,074. Oct. 19, 1954.*

Beverage Filler Having Carbonated Liquid Reservoir, Superimposed Body of Gas Under Pressure, Plurality of Filling Heads, Container Supporting and Valve Means—*C. L. Day and R. H. Reback to Crown Cork & Seal Co., Baltimore, Md. No. 2,692,075. Oct. 19, 1954.*

Metal Container With Free Tearing Strip Defined By Pair of Spaced Encircling Score Lines Terminating in Flat Tongue—*N. Pelosi, Newark to American Can Co., New York City. No. 2,692,699. Oct. 26, 1954.*

Bottle Carrier Formed From Single Paperboard Blank Having Side, Bottom, Center, Divider Panels, Glued Tabs—*S. Lighter, Milwaukee, Wis. No. 2,692,701. Oct. 26, 1954.*

Casing Machine Comprising Container Conveyor, Parallel File Forming Guide, Stop, Plurality of Lift Mechanisms—*A. R. Silva, San Jose, Calif. No. 2,692,713. Oct. 26, 1954.*

Liquid Filler Having Rotating Tank, Vertically Movable Member, Pivotally Mounted Lever, Stationary Cam—*C. R. Spurr, Syracuse, N. Y. to Ex-Cell-O Corp., Detroit, Mich. No. 2,692,717. Oct. 26, 1954.*

Paraffin-Coated Wrapper With Overlapping Portions Folded on Underside and Heat-Sealed, Strip-Like Label Having Inner Thermoplastic Film—*J. L. Elsman to Kalamazoo Vegetable Parchment Co., Parchment, Mich. No. 2,692,723. Oct. 26, 1954.*

Packaging Unit Comprising Endless Closed-Path Conveyor, Bag-Forming, Filling, Closing Members—*B. G. Williams to Delamere & Williams Co., Toronto, Canada. No. 2,693,067. Nov. 2, 1954.*

Filling Machine With Supply Hopper, Elongated Discharge Opening, Carriage, Agitator Rods, Shutter—*M. H. Sidebotham, Winchester, Mass. No. 2,693,306. Nov. 2, 1954.*

Moisture Problem?

Use GARLAND DEODORIZED SUPERNAMEL for Damp Walls and Equipment

GARLAND'S NEW DAMP WALL SUPERNAMEL adheres to moist walls, machinery and equipment. Paint over condensation on interior walls, coolers, vats, tanks or machinery.

DAMP WALL SUPERNAMEL dries overnight at normal temperatures. It's deodorized—no need for shut down because of paint odors.

DAMP WALL SUPERNAMEL won't yellow off, contains a special additive that stops mildew or mould. Made in white and colors.

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Solving Paint, Roof and Floor Maintenance Problems since 1895

Ask for folder A 451

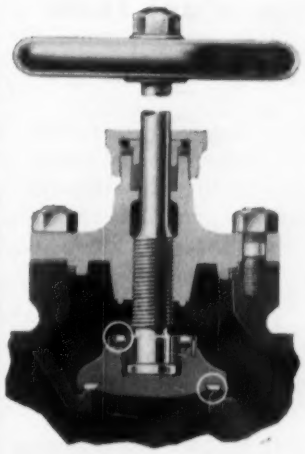
THE GARLAND COMPANY

Dept. FE-3 Cleveland 5, Ohio

YORK REFRIGERATION VALVES AND FITTINGS

posi-tive seal

—A TIME-PROVEN FEATURE OF YORK VALVES!



FACT: Of course York Valves have *positive seal* because York Valves have...

• Soft metal seating surfaces for main and back seat. • Pressure seal between disc and lock nut. • Seating surface bonded metallically to valve disc. No leaks—no loosening. • Seating metal specially refined. Uniform and close grained. • Seats match. Formed at factory with over a ton of pressure per square inch.

FACT: York offers the industry's most complete line—with pipe sizes from ¼ in. to 14 in.

CONCLUSION: These two facts help account for a third—more York Valves and Fittings are in use than any other make. If you're planning a new plant or an addition to your present plant—regardless of what make refrigeration equipment you use—call York. **(York "FREON" and AMMONIA Valves and Fittings are handled by York District Offices and Authorized Jobbers.)**

IT ALWAYS PAYS TO USE YORK ACCESSORIES AND SUPPLIES

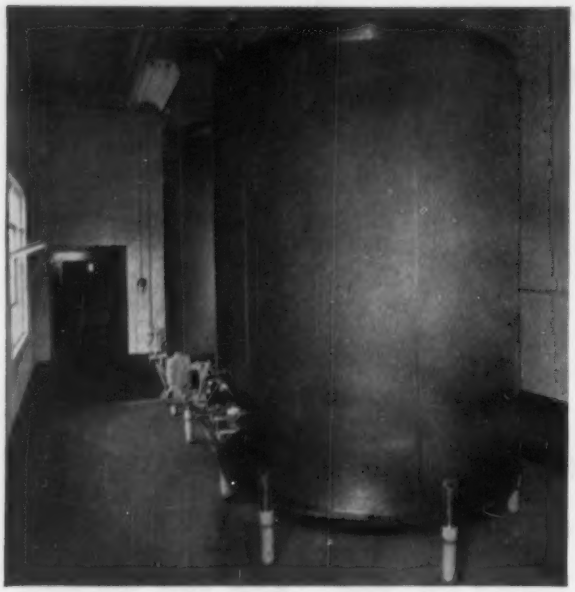
Air Filters • Air Fittings • Automatic Controls • Brine Testing Sets • Can Covers • Can Dumps • Can Fillers • Charging Connections • Coils and Piping • Cold Storage Doors • Freon Refrigerants • Gas Masks • Ice Cans • Motors • Pumps • Oil • Oil Traps • Purge Devices • Receivers • Suction Traps • Valves and Fittings.

York

YORK CORPORATION

the quality name in valves and fittings

HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885



Model "C" closed-top tanks. Vertical sizes, 750-3500 gallons. Horizontal sizes, 500 to 5000 gallons.

Is this stainless steel tank big enough . . . or too big?

When you order tanks from Cherry-Burrell there's no such thing as a size limitation. Our *standard* stainless steel tanks range from 60 gallons through 5000 gallons capacities—larger and smaller tanks available on special order.

Just tell us what size you need, whether you want a single shell tank or one for heating and cooling, closed top or open top types. Your Cherry-Burrell Representative can tell you how we do it. Why not give him a call or write for literature?

Typical Cherry-Burrell Tank Uses

- Water Storage
- Ingredient Storage
- Syrup Making
- Liquid Sugar Making
- Liquid Sugar Storage
- Corn Syrup Storage
- Bulk Storage of Bottling Syrup

Model "O" open-top tanks; capacities 60 to 500 gallons.

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427 W. Randolph Street, Chicago 6, Ill.
Equipment and Supplies for Industrial and Food Processing
SALES & SERVICE IN 57 CITIES—U. S. AND CANADA

Men & Companies

Changes have been announced in Coca-Cola's top echelon. **William E. Robinson** (left), former board chairman of Robinson-Hannagan Assoc., is new president of the company, while **H. B. Nicholson** (right) has been elected chairman of the board and chairman of the executive committee.

INDUSTRY

Blue Bird Baking Co. of Dayton, Ohio, will build a one-story extension of its production and dock facilities for an estimated $175,000.

Beech-Nut Packing Co. has purchased a $1 million plant in Rochester, N. Y. from **Clapp Baby Food div. of American Home Foods, Inc.**

Bowman Dairy, Chicago, has purchased **Model Milk & Ice Cream Co., Inc.,** in Terre Haute, Ind.

Carr Consolidated Biscuit Co.'s plant in Wilkes-Barre, Pa., will be closed by **Winn & Lovett Grocery Co.,** which recently bought the biscuit company.

Consolidated Foods Corp., Chicago, has merged with **Smart & Final Iris Co.,** of Los Angeles.

Eddy's Custom Cannery of Nampa, Ida., has been purchased by Ray L. Dunlap, former food technologist at J. R. Simplot Co., of Caldwell, Ida.

Foremost Dairies, Inc., Jacksonville, Fla., and **El Dorado Oil Works** of San Francisco, have agreed on terms of an offer by Foremost to acquire the California firm through exchange of stock.

Glyco Products Co., Inc. has moved its executive and sales offices from Brooklyn to the Empire State Bldg.

Fruit Industries, Inc., Bradenton, Fla., will build a citrus processing plant at Vero Beach.

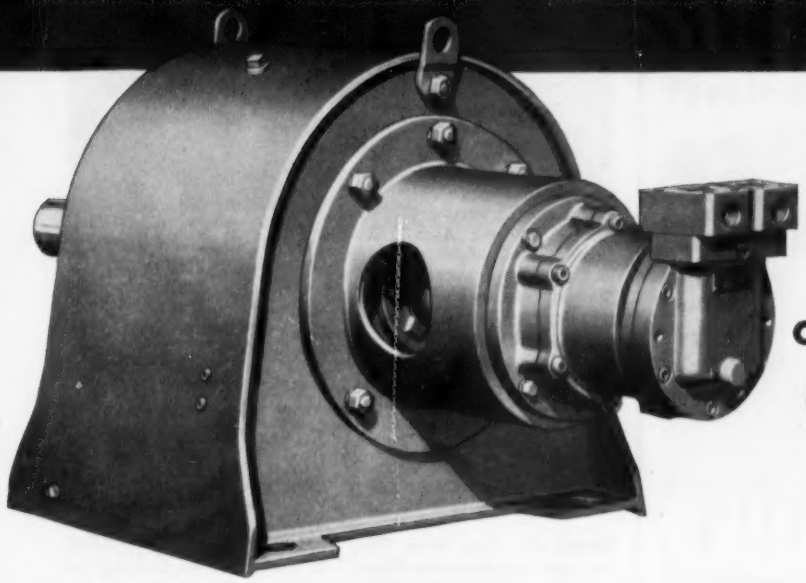
General Bakeries, Ltd., Toronto, has purchased **Palace Bread, Ltd., of Calgary, Alta.**

Hurty, Peck & Co. of California is building a new $45,000 plant, expected to be completed in April.

John Labatt Ltd. has formed a new subsidiary, **La Brasserie Labatt Ltd.,** to own and operate the company's new $6,500,000 brewery being constructed at Ville La Salle.

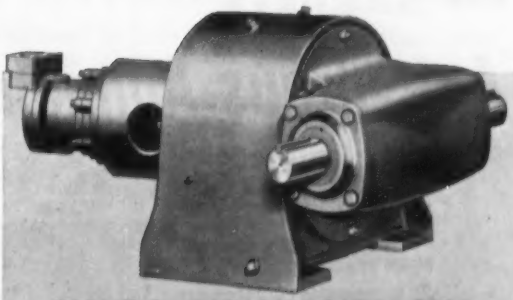
Three new vice-presidents have been elected by Minute Maid Corp. Left to right: **Frank Penn,** in charge of production outside of Fla.; **Wallace R. Roy,** former head of research and development dept.; and **W. Speeler,** corporate counsel and sec'y.

NOW! NEW OILGEARDUCERS



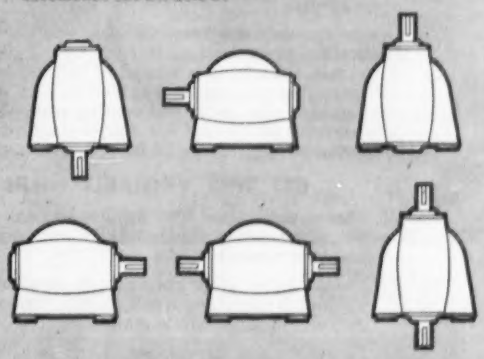
Offering for the first time compact, packaged, fluid power output drive units!

● Oilgearducers are new integral output drive units combining Oilgear Fluid Power axial piston motors and Falk All-Steel Reducers. There are horizontal and vertical models, concentric and right angle types and single, double, triple and quadruple reduction. Now, for the first time you can get a complete, easy to install, "ANY-SPEED" output unit for your high torque, low maximum speed drives. When used in combination with Oilgear Fluid Power Pumps, these reversible Oilgearducers provide infinite variability of speed, absolutely controlled rate of acceleration and deceleration, smooth and swift reversal, cushioned braking. All these together with major economies in motor, circuitry and power requirements. This new Oilgearducer "Any-Speed" output unit is available in sizes from 1 to 20 h.p. It is unequalled for applications as diverse as can-filling, paper machines, centrifugals, cable wrappers . . . and in automation or feed back applications where synchronization is an absolute necessity. Write now for new bulletin 56610. THE OILGEAR COMPANY, 1580 West Pierce Street, Milwaukee 4, Wisconsin.



RIGHT ANGLE OILGEARDUCERS

Oilgearducers with right angle output shafts are available in ratios ranging from 5 to 1500: 1. In assemblies shown below.



Write for this new Bulletin 56610

OILGEAR

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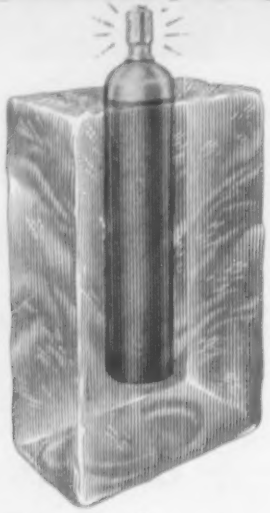
PIONEERS...NOW THREE PLANTS FOR FLUID POWER

PUMPS, MOTORS, TRANSMISSIONS, CYLINDERS & VALVES

Freeze Out HIGH REFRIGERATION COSTS!



USE BARRETT® BRAND

Anhydrous Ammonia

GET: 1. Lower Operating Costs!

2. Outstanding Delivery Service!—high speed delivery! Cylinder stocks maintained at all our coast-to-coast distribution stations. There is one near you ready to fill your needs *promptly* and *regularly*. 150, 100 and 50-lb. cylinders.

3. Outstanding Purity!—no free non-condensable gases to cut down efficiency, or other impurities to corrode equipment.

4. Extremely Low Moisture!—doesn't freeze up expansion valves, corrode equipment or ice up in evaporators.

Operating costs are lower because you get more refrigeration per pound of Barrett Brand Anhydrous Ammonia than from a pound of any other type of refrigerant commonly used in food lockers, ice plants, cold storage and industrial cooling processes—all at a lower cost per pound for Ammonia. Order a trial shipment of 150, 100 or 50-lb. cylinders today!

GET THIS VALUABLE HELP!

☐ Please send your **FREE** Ammonia Leak Detector Kit. (Pocket size, this handy kit can be used over and over again.)

☐ Please have your specially trained Ammonia Technical Serviceman call, discuss the economical use, etc. of Anhydrous Ammonia. No obligation.

☐ Please send your valuable handbook, "Guide to use of Barrett Brand Cylinder Ammonia." (Shows most economical usage; contains chemical properties, handling, charts, etc.)

First In Ammonia Since 1890

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ALLIED CHEMICAL & DYE CORPORATION

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Hopewell, Va. • Ironton, Ohio • Orange, Tex. • Omaha, Neb.

Joe Lowe Corp. has acquired major interest in **Fradelis Frozen Food Corp.** of Los Angeles.

Daniel W. Mikesell, Inc., of Dayton, Ohio, plans to begin construction on a new one-story plant this month.

Pepsi-Cola Co. has begun erection of a new plant in Philadelphia which will be completed in August.

Placentia Orange Growers Assn. and **Fullerton Mutual Orange Growers Assn.** have merged.

Simplex Packaging Machinery, Inc. of Oakland, Calif., has announced handling of its export sales to all countries except Canada, Hawaii, and Alaska, by **Food Machinery & Chemical Corp.'s** export div.

Swift & Co. has announced a $600,000 expansion program for its Honolulu plant.

Borden Co., New York City, has acquired **American Monomer Corp.** and **Monomer-Polymer, Inc.** of Leominster, Mass.

Personnel

Mary M. Anderson has joined Karl Seiler & Sons, Inc., of Philadelphia as home economist.

Edwin F. Battson, vice-president of Continental Oil Co., and **James M. Trotter,** of W. E. Trotter & Son, have been elected to the board of Godchaux Sugars, Inc.

L. M. Becker is new president of Breakstone Bros., Inc., dairy product firm of New York City.

Jeremiah B. Bloom, member of the New York City council, has been elected secretary and a director of the new No-Cal Corp.

Robert A. Bradford has been named assistant to the general sales manager of Miller Brewing Co. And **Raymond A. McGinn** is new acting district sales manager for Illinois.

Joseph H. Cohen, and **John K. Evans** have been elected vice-presidents of General Foods Corp.

Allan Cooper has been appointed general merchandise manager for Ocoma Food Co., Omaha.

John A. Grammer, secretary of Beech-Nut Packing Co., of Canajoharie, N. Y., has been elected to the board of directors. He has also been appointed director of personnel.

J. Roy Duggan has been elected president of the Sea-Pak Corp., succeeding Jaxon O. Hice.

Albert Foster is vice-president in charge of engineering for Standard Brands, Inc.

Thomas Grenier has been appointed supervisor of research and products controls departments for Pfeiffer's Food Products of Buffalo.

Herbert M. Gross has been named manager of all **Pepsi-Cola** bottling plants in the Philadelphia area.

Raymond J. Guerrisi, former vice-president, has been elected president and general manager of San Georgio Macaroni, Inc., Lebanon, Pa.

W. H. Hagenmeyer has been elevated to the position of vice-president of International Milling Co., Minneapolis.

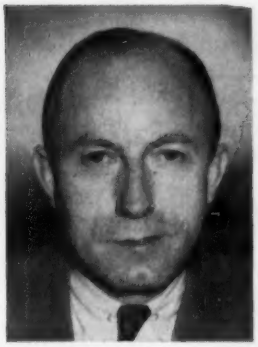
Julian L. Hill is now treasurer of Rosenberg Bros., San Francisco.

Alfred J. Hoefer has been elected vice-president of Libby, McNeill & Libby.

John Holmes, president of Swift & Co. since 1937. has been elected chairman of the board. **Porter M. Jarvis** has been chosen president.

Frank Knuth has been elected president of the Bright Spot Bottling Co. of Milwaukee.

Andrew C. Kunkel has been elected vice-president in charge of sales for Breyer Ice Cream Co., Philadelphia.



Thomas J. Lipton, Inc., has promoted **Harold L. Shuttle** (left) to the post of vice-president in charge of sales, and **William B. Smith** (right) becomes vice-president in charge of advertising.

A. Ross MacKenzie has been named president of Purity Flour Mills Ltd., Toronto.

Oscar G. Mayer, Jr., was elected president of Oscar Mayer & Co. succeeding his father Oscar Mayer, Sr., who is now chairman of the board of directors.

Joseph W. Mooney has been chosen a member of the board of directors of the American Sugar Refining Co.

Dean McNeal has been elected a director of Pillsbury Mills, Inc., of Minneapolis.

Willie Osburn is now president of Baroni French Baking Co., Inc., Richmond, Calif., after buying half interest in the firm.

Frank E. Robb has been elevated to executive vice-president of Campbell Soup Co.

Clifford E. Smith has been promoted to new position of research associate at A. E. Staley Mfg. Co., Decatur, Ill.

James D. Wise, president of Bigelow-Sanford Carpet Co., Inc., has been elected a director of Ward Baking Co.

Robert W. Young, Jr. has been named a director and vice-president in charge of advertising for Golden Gift, Inc. of Deland, Fla.

Associated Industries

Allied Container Corp. has elevated Herman Jaffee to vice-president in charge of food package div.

American Box Co., Cleveland, has appointed James E. Roddy manager of its new corrugated box division.

American Can Co. has formed a new products dept. It will be headed by Roscoe M. Roberts.

J. H. Day Co., Inc., Cincinnati, is exclusive sales and service depot for Rapisonic homogenizer which utilizes ultrasonic waves. (FE June, '53, p. 147).

Food Machinery & Chemical Corp. has acquired the food canning machinery business of **Chain Belt Co.,** Milwaukee.

International Paper Co. plans to build a paper milk container plant at Waco, Tex.

Metro Glass Co., Inc., has opened a new glass plant in Dolton, Ill., to be managed by William Gallagher.

National Can Corp. has completed purchase of **Pacific Can Co.** for $19 million.

Sutherland Paper Co., Kalamazoo, Mich., has acquired all assets of **Reish Products, Inc.,** of South Bend, Ind.

C. Tennant, Sons & Co. of New York City has appointed Dr. E. M. Huttrer head of its special machinery dept.

Visible Package & Paper Corp. has named Charles F. Pfeifer as president and general manager.

DEATHS

Harold Carlsen, vice-president in charge of plant operations for Malt-Diastase Co. of Brooklyn.—Jan. 10.

Patrick F. Gallagher, 89, former general manager and vice-president of National Bread Co., Buffalo.—Jan. 16.

What's YOUR Heating or Air Conditioning Control Problem?

...with their 60 years of experience installing pneumatic systems of temperature and humidity control in all types of important buildings are well qualified to help you obtain the greatest return from an investment in—

ACCURATE UNIFORM CONTROL

in all types of heated or air conditioned spaces—offices, factories, process rooms, processes, research and test laboratories, packaging or storage rooms. You can gain...

Some Prominent Users of Powers Control:

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Chrysler Corp.
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Bendix Aviation Corp.
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Armour & Co. • Swift & Co.
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Increased Efficiency and Output of Workers by keeping each room or department at its proper temperature.

Cuts Heating Costs up to 25%—23% fuel savings reported by E. R. Squibb & Sons. With today's higher fuel costs bigger savings than ever before are possible with Powers control. It eliminates fuel wasted by OVER-heating with manual operation.

Precision Control for Processes—Wherever product uniformity and quality are dependent upon precise temperature and humidity regulation use Powers controlling, indicating or recording instruments.

Phone or Write Powers Nearest Office for aid in selecting the type of automatic control that will give best results for your requirements. There's no obligation. Powers control systems can be installed in existing as well as new buildings.

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defy animal fats!

SNUGLEG BOOTS . . .
12-inch, snug-fitting ankle. Sure-footed molded sole and heel.
Gray, sizes 6-13.
Available both in plain and steel toes.

Especially designed for dairies and meat packing plants

Men in these industries will find Butylac Boots invaluable. Their high resistance to butter fats, animal fats, lactic acid is exceptional. Butylac Boots are comfortable, durable. Stretchy net lining and cushion insole. Deep cleated, molded soles resist slipping. *Butylac Boots you need.*

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US RUBBER
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PLANT ENGINEERING

Magnetic Separators

Detailed compilation of types of magnetic installations for removal of unwanted iron. Catalog 17. 16 p.—*Eriez Mfg. Co., Erie, Pa. (214A).*

Pumping Problems

Line of pumps to answer specific pumping problems.—*Viking Pump Co., Cedar Falls, Iowa. (214B.)*

Condensers

Single high-capacity units or battery of condensers for refrigeration systems. Bulletin 111.—*Niagara Blower Co., 405 Lexington Ave., New York City 17. (214C).*

Ventilating Fan

Description of limit load fan with self aligning bearings, new type inlet guide vanes. Folder F-102.—*Buffalo Forge Co., 152 Mortimer St., Buffalo, N. Y. (214D).*

Double Suction Pumps

Line of pumps in stock sizes from 10 to 7000 gpm. Brochure 08B6146. — *Allis-Chalmers, Milwaukee 1. (214E).*

Valves, Fittings

General catalog includes description of sanitary valves and fittings, holding tubes, centrifugal pumps, and sanitary specialties.—*G & H Products Corp., 2415 52nd St., Kenosha, Wis. (214F).*

Close-Coupled Pumps

Description of 5 gpm. to 2800 gpm. pumps. Form 7093-D.—*Ingersoll-Rand, 11 Broadway, New York City 4. (214G).*

Motor Designs

Bulletins on brakemotors, wound rotor, squirrel, and d.c. motors offered.—*Star-Kimble, Motor Div., Bloomfield Ave., Bloomfield, N. J. (214H).*

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Carbon piston compressor that supplies oil-free air, discussed and illustrated. Bulletin CRC-10. 8 p. —*Gardner-Denver Co., Quincy, Ill. (214J).*

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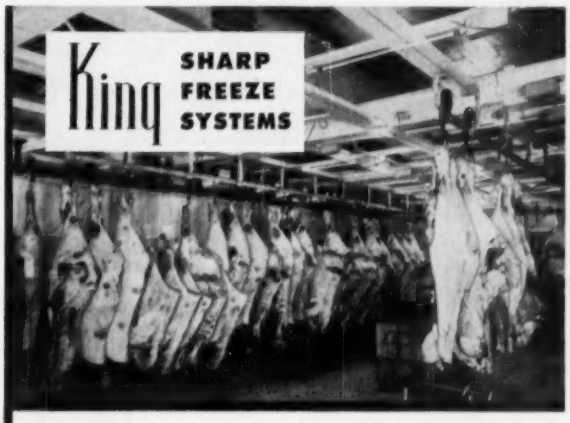

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Description of line of electric power drives. Catalog 201. 20 p.—*Sterling Electric Motors, Inc., 5401 Telegraph Rd., Los Angeles 22. (217B).*

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Information on rotary dryers with illustrations. Catalog 12 p.—*Standard Steel Corp., 5045 Boyle Ave., Los Angeles 58. (217E).*

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Operation features and installation views on diaphragm valves for acids, alkalis, gases, voltatile and viscous substances. Brochure V-54. 32 p.—*Hills-McCanna Co., 3025 N. Western Ave., Chicago 18. (217F).*

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Illustrated description of all molded plastic (PVC) valve and fittings, corrosion resistant to industrial chemicals.—*Lunkenheimer Co., Cincinnati 14. (217G).*

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Fifty small precision cutting tools described.—*Woodruff & Stokes Co., Inc., 343 Lincoln St., Hingham, Mass. (217I).*

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Description of products made with neoprene. Notebook 62. 8 p.—*E. L. Du Pont de Nemours & Co., Wilmington, Del. (217J).*

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Details and specifications covering line of stainless steel fittings. Folder 1-154.—*Ladish Co., Tri-Clover Div., Kenosha, Wis. (217T).*

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Description of bearings of special hardwood treated with long lasting, lubricant applicable for screw conveyors or conveyor rolls, installation instructions, dimensional details and operating conditions included. Catalog 210. 20 p.—*Arguto Oilless Bearing Co., Philadelphia 44. (217U).*

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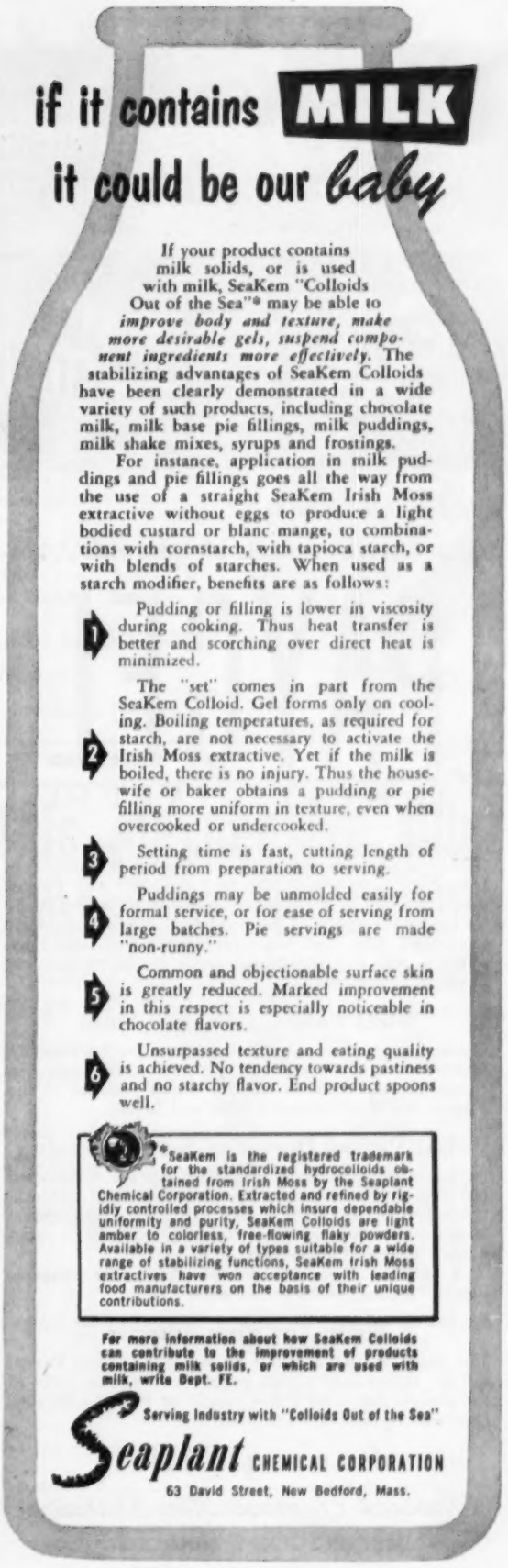
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Sleeve type bearing composed of metal shell with thin lining or core of nylon described.—*Nylacore Corp., Great Neck, N. Y.* (218B).

Plastic Pipe, Fittings

How to use and specify rigid plastic pipe and fittings. Catalog 131. 12 p.—*Alpha Plastics, Inc., 14 Northfield Rd., West Orange, N. J.* (218C).

Tubing

Guide to selection and application of stainless steels, beryllium-copper, titanium, and alloy tubing. Bulletin 40. 8 p.—*Superior Tube Co., Norristown, Pa.* (218D).

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Applications of Stontop on concrete floors prevents breakdown of sand and cement particles and guards against ruts and holes.—*Stonhard Co., 1306 Spring Garden St., Philadelphia 23.* (218E).

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Description of safety plate, floor material which reduces slipping and skidding, will take hard wear, is fire proof and can't absorb liquids.—*Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80.* (218F).

Spray Nozzles

Characteristics, construction, and recommended uses of line of spray nozzles and accessories. Folder 32. 12 p.—*Delavan Mfg. Co., Grand Ave. & 4th St., West Des Moines, Iowa.* (218G).

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Line of pasteurizers for milk and milk products, three sizes available. Bulletin G-500. 6 p.—*Cherry-Burrell Corp., 427 W. Randolph St., Chicago 6, Ill.* (218H).

Heat Exchangers

Three models of heat exchangers described for pasteurizing, heating, cooling and regeneration.—*De Laval Separator Co., 427 Randolph St., Chicago 6.* (218I).

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Statistics and applications of continuous pipe line water heater with illustrations. Bulletin 3A. 20 p.—*Schutte & Koerting Co., Cornwells Heights, Bucks Co., Pa.* (218J).

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Descriptions and pictures of many types of processing machines with price list.—*Akron Equipment Co., Akron 9, Ohio.* (218K).

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Information on various types of food mixers and attachments.—*Triumph Mfg. Co., 3410 Spring Grove Ave., Cincinnati 25.* (218N).

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General principles of electrical precipitation and its applications.—*Research-Cottrell, Inc., Bound Brook, N. J.* (218P).

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Colored illustrations supplement text about line of milk evaporators. Catalog 364. 16 p.—*Blaw-Knox Co., Dairy Equipment Dept., Mora, Minn.* (218Q).

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Portfolio of all types of electric cooking equipment. — *Hotpoint Co., Commercial Equipment Dept., 227 S. Seeley Ave., Chicago 12.* (218T).

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Automatically made brine from Sterling rock salt or evaporated salt.—*International Salt Co., Inc., Industrial Div., Scranton 2, Pa.* (218V).

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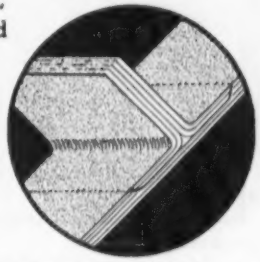

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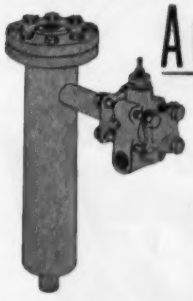

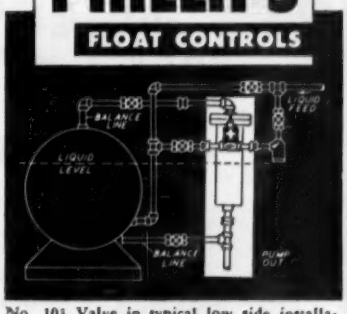

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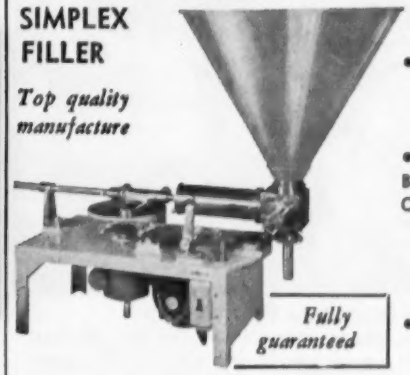

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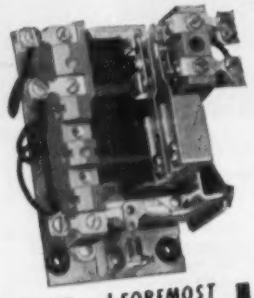

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Stainless steel inspection table with non-absorbent belt has roll over action.—*A. K. Robins & Co., Inc., 713-129 E. Lombard St., Baltimore 2. (221B).*

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Features of filter presses described fully with charts and photographs.—*T. Shriver & Co., Inc., 810 Hamilton St., Harrison, N. J. (221C).*

Processing Equipment

Line of processing machinery including hoppers, pressure vessels, tanks, illustrated and described. Bulletin 550.—*L. O. Koven & Bro., Inc., 154-D Ogden Ave., Jersey City 7, N. J. (221D).*

MATERIALS HANDLING

Conveyor Units

Line of conveyor equipment illustrated and explained.—*W. F. & Barnes Co., 301 S. Water St., Rockford, Ill. (221E).*

Metal Conveyor Belts

Pictures, specifications, and diagrams of spiral woven, flat wire, and flex grid conveyor belts. Catalog 5. 32 p.—*Cyclone Fence, Waukegan, Ill. (221F).*

Gravity Conveyors

Line of conveyors described, including power belt, gravity, and package handling conveyors. Bulletin 400.—*Oliver Corp., A. B. Farquhar Div., Conveyor Dept., York, Pa. (221G).*

Conveyor Service

Specifications, drawings and application data on wide range of conveyors, including gravity and power types. Booklet 63-D. 28 p.—*Standard Conveyor Co., North St. Paul 9, Minn. (221H).*

Mesh Conveyor Belts

Mesh specifications, design information, and metallurgical data on wire mesh conveyor belts. Reference manual. 130 p.—*Cambridge Wire Cloth Co., Cambridge 2, Md. (221I).*

Guide Rails

Plastic lined guide rails for conveyors and packaging machines. Folder GR-301.—*US Gasket Co., Camden 1, N. J. (221J).*

Lift Jacks

Description of lift jack with wood or steel semi live skids to transport and release load of goods.—*Colson Corp., Elyria, Ohio. (221K).*

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All types of belting to handle foodstuffs packaged or in bulk.—*A. J. Sparks & Co., 862-864 Grandville Ave., Grand Rapids, Mich. (221L).*

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Conveyor belts of rubber for every kind of food processing and package handling.—*U. S. Rubber Co., Rockefeller Center, New York City 20. (221N).*

Fork Truck

Specifications of fork truck with 20-in. fork tilt.—*Yale & Towne Mfg. Co., Roosevelt Blvd. & Haldeman Ave., Philadelphia 15. (221O).*

Battery Trucks

Illustrated description of motorized battery operated trucks. Bulletin 53. 6 p.—*Moto-Truc Co., 1953 E. 59 St., Cleveland 3. (221P).*

Unloader

Information on hydro magnetic retort basket unloaders to handle tin or glass.—*W. F. & John Barnes, 320 S. Water St., Rockford, Ill. (221Q).*

Electric Truck

Line of battery powered, rider type trucks for 6 ft. aisle operations. 24 p.—*Raymond Corp., 62-131 Madison St., Greene, N. Y. (221R).*

Bulky-Item Carrier

Specifications of forward-control chassis designed to carry bulky items.—*Dodge, Chrysler Corp., Detroit. (221S).*

Overhead Crane

Line of cranes for light, medium, or heavy service discussed.—*Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y. (221T).*

Dairy Tank

New developments in construction of dairy tanks including inlet fitting mounted through top of tank to increase storage capacity and stream flow agitator.—*Pfaudler Co., Rochester 3. (221U).*

Palletizing Filled Bags

Booklet, *Palletizing Filled Milthwall Bags*, contains useful ideas to facilitate handling, shipping and adapting bags now being used to fit a given pallet.—*Arkell & Smiths, Packaging Dept. Canajoharie, N. Y. (221V).*

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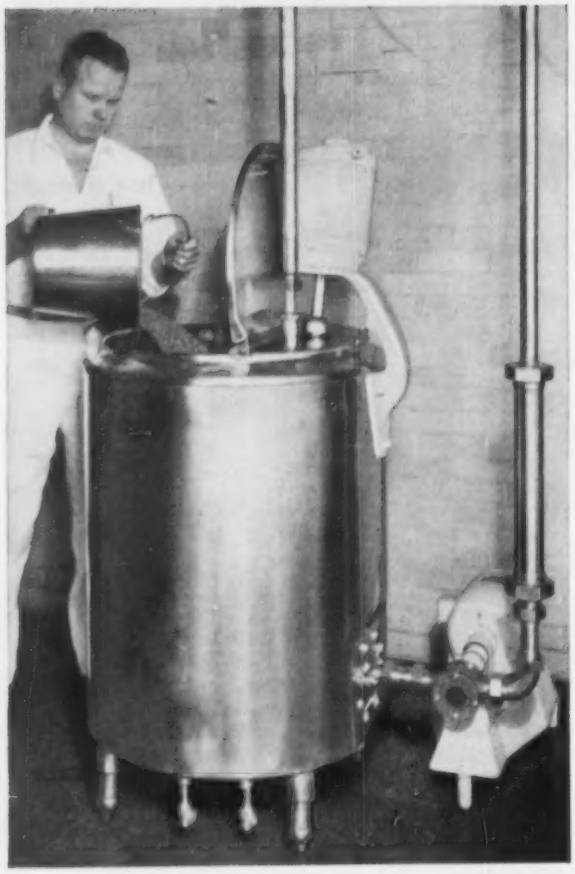

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Wattage Control

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Electric-Control Care

Simplification in maintenance of complex electrical controls described.—*W. F. & John Barnes Co., Electrical Div., 301 S. Water St., Rockford, Ill. (222F).*

Magnetic Test Unit

Method for checking ferrous metal objects for surface discontinuities.—*North American Philips Co., Inc., Mount Vernon, N. Y. (222G).*

Chart Controllers

Specifications for instruments and listing of control forms available. Circular 163-1. 2 p.—*Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44. (222H).*

Time-Pattern Transmitter

Specifications of pneumatic time-pattern transmitter that positions set point indices of one or more instruments according to a definite time pattern. Specification sheet 287-1. — *Minneapolis-Honeywell Regulator Co., Philadelphia 44. (222I).*

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Temperature Transmitter

Information on construction, performance, installation, and standard thermal elements of Nullmatic temperature transmitter. Bulletin 3302. 8 p.—*Moore Products Co., H & Lycoming Sts., Philadelphia 24. (222K).*

PACKAGING

Packaging Machines

Illustrated description of line of packaging machines.—*Package Machinery Co., Springfield, Mass. (222L).*

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Description of fast filling machine rated to fill 800 containers a minute.—*Pfaudler Co., Rochester 3, N. Y. (222M).*

Marking Attachments

Automatic marking of cases and cartons with models for imprinting top, ends, or sides of cartons. —*Adolph Gottscho, Inc., Hillside 6, N. J. (222N).*

Paper Bags

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Plastic Containers

Description of transparent plastic containers with metal bottoms. —*J. E. Plastics Mfg. Corp., Food Promotion Div., 555 W. 23 St., New York City 11. (222P).*

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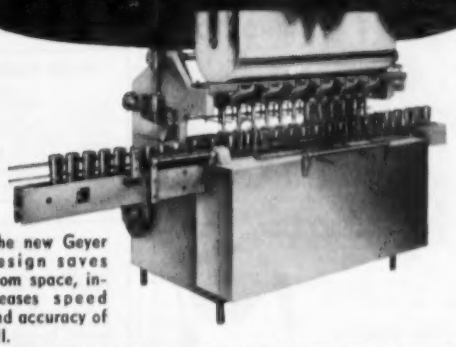

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(Continued on opposite page)

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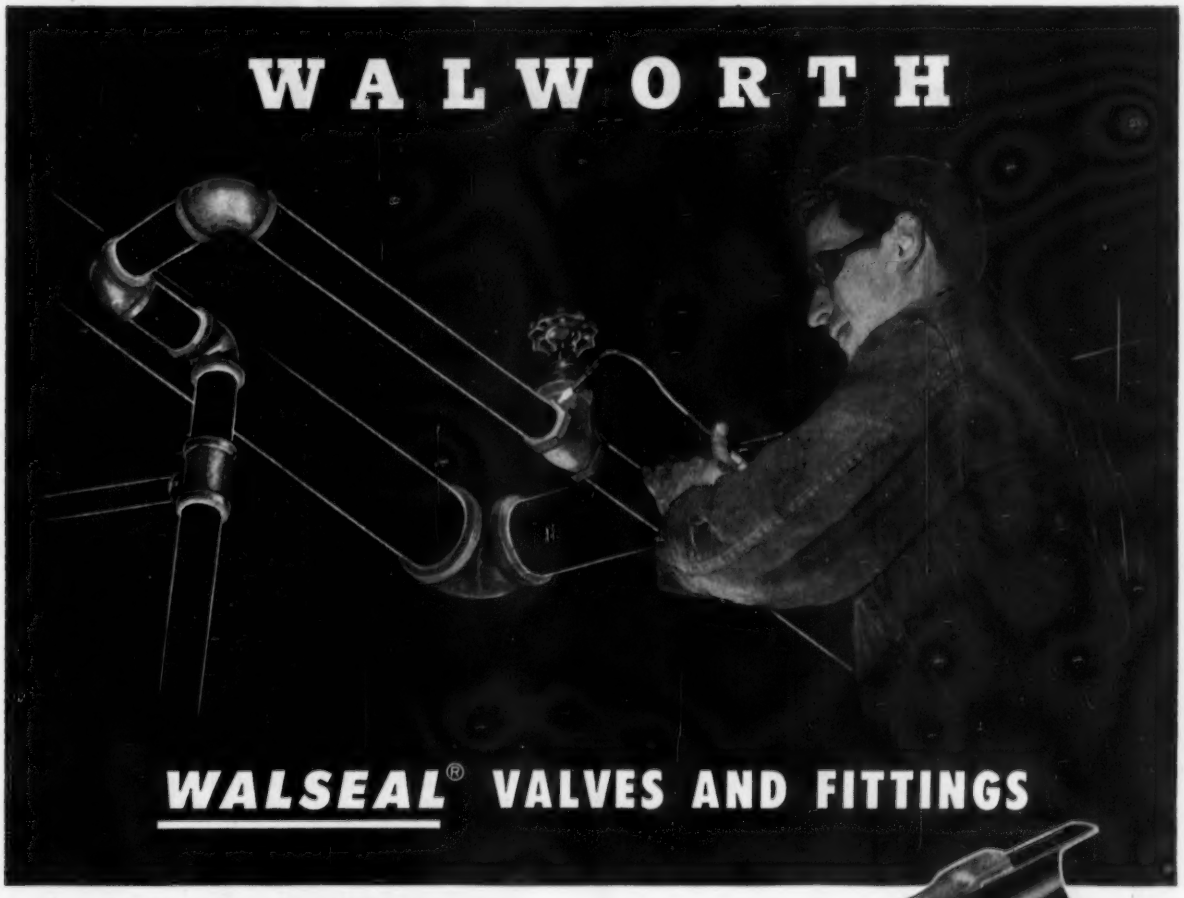

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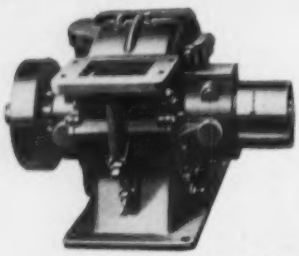

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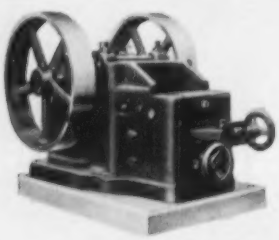

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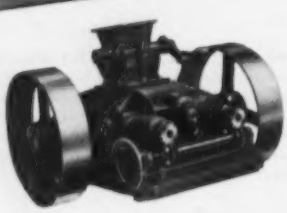

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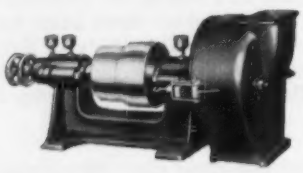

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4. notify us of a change of address

Product Index on other side

1. FOR PRODUCT INFORMATION

Circle page numbers at right. Suppliers will reply direct to you. No obligation. →

IMPORTANT—FOR PAGES SHOWING MORE THAN ONE ADVERTISED ITEM, USE THIS GUIDE TO NUMBERS ON CARD

4 All items shown
4a Buls. 52B6351, 52B6105
4b Buls. 52B6083, 52B6140
4c Bul. 52B7638
4d Bul. 52B6615
4e Bul. 52B7112
18a Belt conveyors
18b Scraper conveyors
38a Brine-making mtl.
38b Salt
44a Bi-Cap
44b Vitamins
51a Bucket elevators
51b Screw conveyors
114 All items shown
114a Flavor costs
114b Emulsion & formulas
114c Applications & recommendation
114d Spice oils
114e Pickle spicing
114f Catsup spice
114g Seasonings
114h Ekomo flavors
114i Fritzbro aromes
114j Fritzbro fruitbase
132a Model 40P-MSLF
132b Model 40P-DF
137a Crane bul.
137b Hoists
146a Hazon unit
146b Bactericide
157 All items shown
157a Buls. 1-5P1, 1-1P3, 2-1P1
157b Buls. 6-1P1, 6-1P3, 6-1P41, 6-1P45, 6-3P1
157c Bul. 10-1P1
157d Bul. 11-1P1
157e Buls. 4-5P21-61, 4-1P31
157f Buls. 18-1P21, 18-1P1
160 All items shown
160a Squirrel cage
160b Brakemotors
160c Wound rotor
160d D-C motors
179a Rotary driers
179b Mtls.-handling cat.
181a Ethavan
181b Vanillin
188a Rolacoder
188b Refrigerating mach.
197a Cat. 953
197b Cat. E52
200 All items shown
200a Cat. B-E
200b Cat. C-E
200c Cat. D-E
200d Cat. E-E
200e Cat. F-E
200f Cat. G-E
200g Cat. H-E
200h Cat. I-E
200i Cat. J-E
200j Model "1000"
202 All items shown
202a Purity NCS
202b Clearjel
202c Flatex
202d Purity SDW
203a Dust collector
203b Belting
204a Sanitation services
204b Steel
204c Pumps
209a Folder A451
209b Valves & fittings
215a Cat. 24
215b Freeze systems
215c Permaseal
216a Cat. CC
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220b Spray nozzle
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221a Filler DS-1
221b Filler DM-1
223a Geyer filler
223b Natural spices

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1	2	3	4	5	6	7
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PLEASE TYPE OR PRINT—GIVE COMPLETE INFORMATION

Name .....

Position .....Product .....

Company .....

Street .....

City .....State .....

March, 1955 Card expires June 10, 1955

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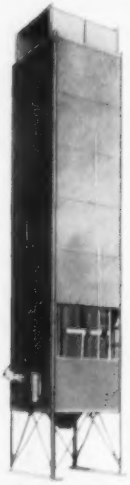

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